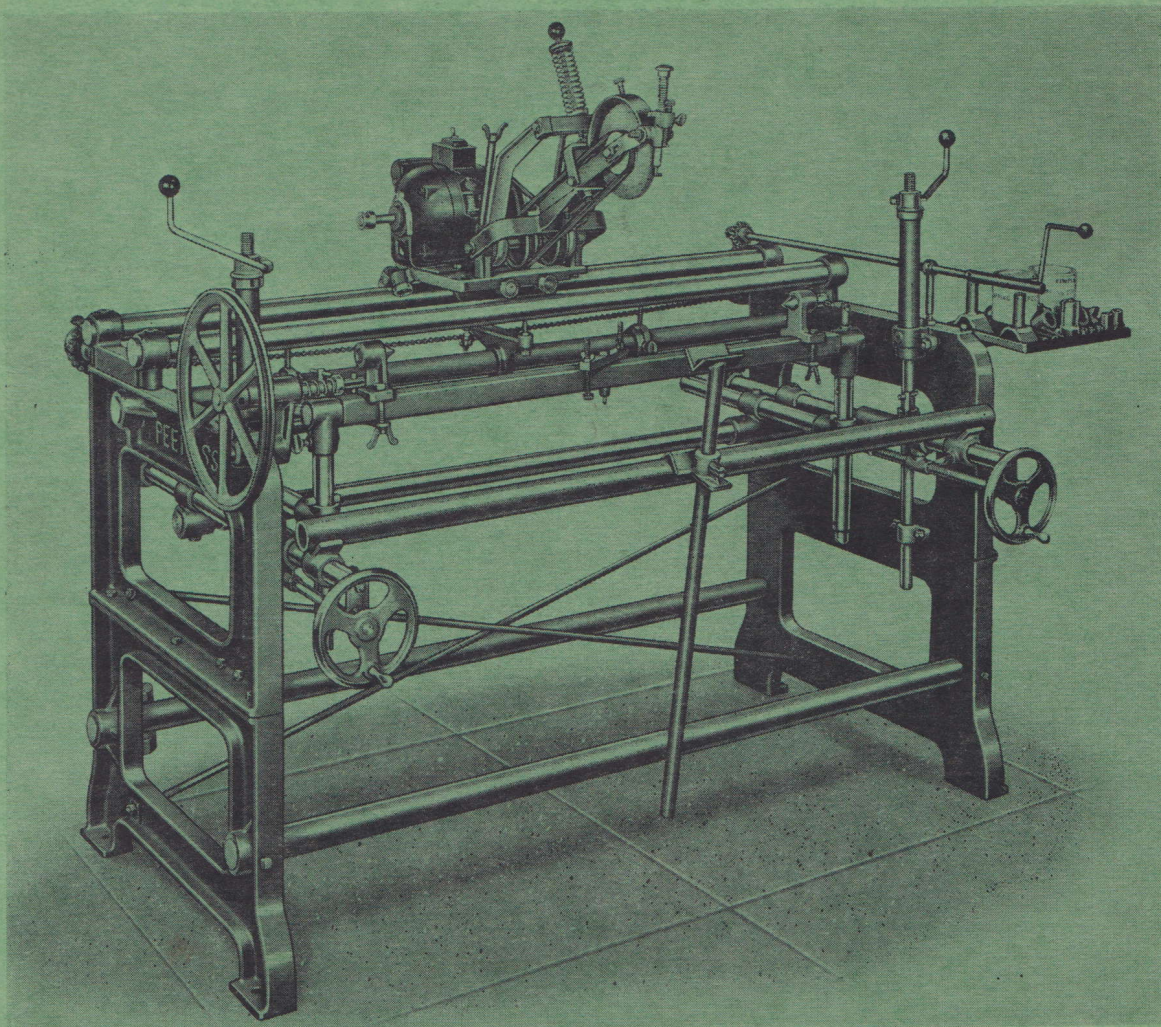


Instructions For The Operation Of The Model 600

PEERLESS LAWNMOWER SHARPENER



COVERING PEERLESS SHARPENERS WITH SERIAL NUMBERS 5650 AND HIGHER
PRICE 50 CENTS



Manufactured by
THE FATE-ROOT-HEATH COMPANY • PLYMOUTH, OHIO

We Manufacture the Following Equipment For the Lawnmower Shop

THE IDEAL BED KNIFE GRINDERS, MODELS 50 and 77

These are bench-mounted bed knife grinders for fast and accurate sharpening of mower bed knives and other straight edge tools. The Model 50 will also sharpen ice skates.

THE SIMPLEX RECONDITIONER (Model 500C)

This is a separate floor type or bench type reconditioner for busy shops that require a separate "back-lapping" machine.

(We do not manufacture or sell saw filing or grinding machines or key making machines.)

THE SIMPLEX LAPPING MACHINE (Model 100)

This is a portable lapping machine for reconditioning hand or power mowers on the floor or out on the grass. This unit is carried to the mower.

THE PEERLESS KNIFE SHARPENER (Model 40)

For grinding all cutlery knives, shears and scissors. This is a heavy-duty shop machine which will make your shop the headquarters for all home grinding needs.

Other Products of **THE FATE-ROOT-HEATH COMPANY**

PLYMOUTH LOCOMOTIVES

These are general switching and hauling locomotives ranging in size from 2½ to 70 tons.

F.R-H CERAMIC MACHINERY

De-airing Brick and Tile Machines, Cutters, Hydraulic Presses, Pug Mills, Conveyors and special ceramic machinery.

THE FATE-ROOT-HEATH COMPANY

PLYMOUTH, OHIO, U. S. A.

INTRODUCTION . . .

The Fate-Root-Heath Company is located in Plymouth, Richland County, O., in the north-central portion of the state about thirty-five miles south of Lake Erie. This company has been engaged in manufacturing in this location since 1890 and the Ideal Lawnmower Sharpener has been manufactured here since 1902.

Products of the company, besides the Ideal and Peerless Lawnmower Sharpeners, include F-R-H Ceramic Machinery for the manufacture of brick, tile, and all types of pottery, "Plymouth" Industrial Locomotives ranging from 3 to 70 tons in weight for all types of motor fuel. In addition to these manufactured products, the Company operates a grey-iron foundry which supplies their own casting needs along with the requirements of other firms in this area. The Company employs approximately four hundred people and covers 11 acres of ground with twenty-one buildings containing over 200,000 square feet of floor space.

The first Ideal Lawnmower Grinder was introduced in 1902 and seven years later the now famous "Hook" grinding principle was invented and patented by Mr. P. H. Root, a Vice-President of the firm who is still active in the Lawnmower Sharpener Division. In 1916 the Peerless Lawnmower Sharpener was added to the line and in the years that followed many improvements and other machines were developed for the lawnmower serviceman and service shops by this division of the Fate-Root-Heath Company.

The Model 600 Peerless Mower Sharpener is a precision machine capable of grinding to exceedingly close limits and, if you do your part correctly, it will not fail you. Read these instructions completely and carefully before grinding your first mower and be sure that your first mower is properly prepared for grinding. Our experience has proven that the majority of unsatisfactory sharpening jobs can be traced to the fact that the lawnmower itself was not properly prepared for grinding.

In the following pages we will explain every step and operation of the machine and the necessary steps for preparing a mower for sharpening. These instructions have been broken down to simplest possible terms so if some steps seem over-explained, please bear with us but do be sure you understand each step.

We cordially invite you to write us personally if any phase of the operation is not clear or to offer constructive criticism which you feel would be of benefit to others. If the opportunity should present itself, please call at our plant in person, you are always welcome.

Sincerely,

THE FATE-ROOT-HEATH CO.,

Lawnmower Sharpener Division

INSTRUCTIONS FOR UNCRATING AND ERECTING THE MODEL 600 PEERLESS MOWER SHARPENER

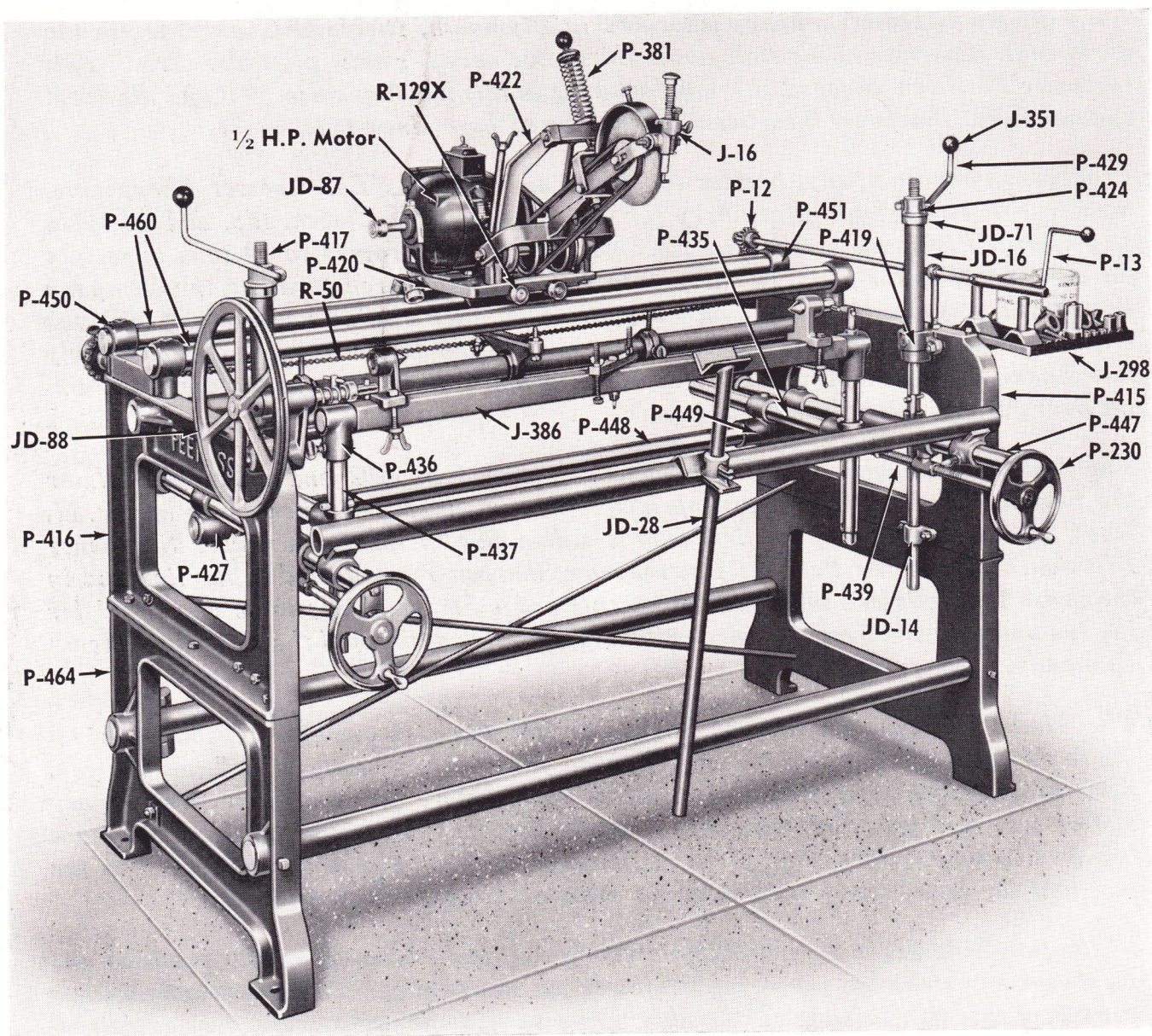


Fig. 1

1. This instruction book covers the operation of the finest, most complete mower sharpener that has ever been manufactured, the Model 600 Peerless Mower Sharpener. Read and understand each step carefully before you begin to grind your first mower. This instruction book is just as complete as we can make it and the more important steps and principles have been repeated over and over again to emphasize their importance. If there remains anything that you do not understand, a letter or post card outlining your questions will bring a prompt reply.

2. The Model 600 Peerless Lawnmower Grinder is shipped complete in one crate. To uncrate the Peerless it is only necessary to remove the nails around the base of the crate so that the crating can be lifted off. This will

leave the machine as shown in Fig. 1, except for the grinding head and a few other parts.

3. The Peerless is a self contained machine and need not be fastened to the floor. There are holes provided in the feet of the machine which can be used to bolt the machine to the floor or base if so desired. The holes also provide a means to use a bolt with double nuts on each side as leveling bolts so that your machine may be properly leveled without the necessity of shimming to obtain the desired results.

4. The first step in setting up your Peerless is to remove the machine from the shipping base. Also remove the two boxes which have been secured to this base. In

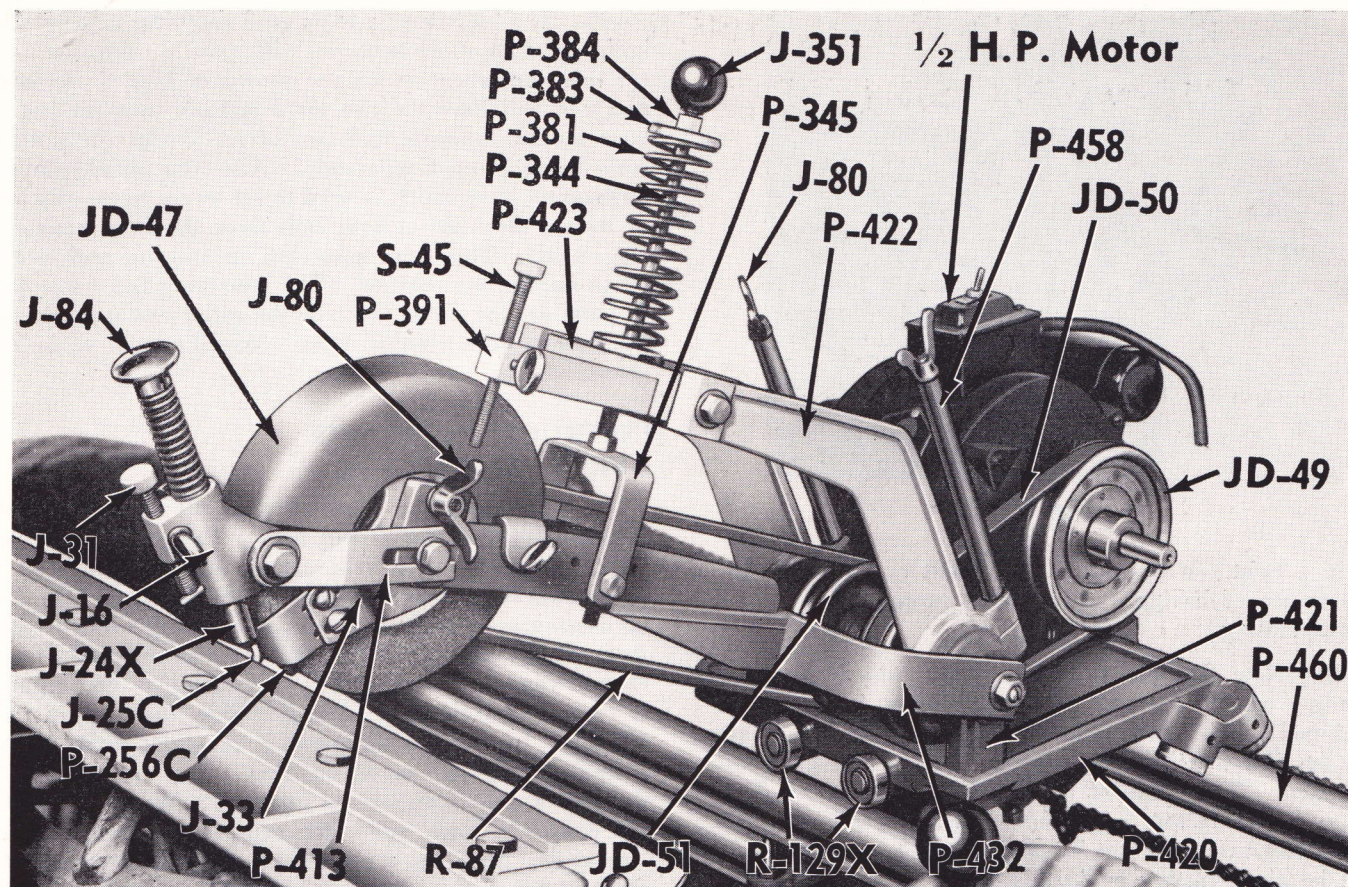


Fig. 2

the large wood box you will find your complete head assembly. The cardboard box contains the reconditioner or lapping-in attachment, if ordered, and other small loose parts including the weight feed, extra couplers for the reconditioner, lapping compound, etc. If the bed knife grinding attachment has been ordered with your machine it will be wired to the base of the crate. This must be removed and the machine placed at the spot where it will be used.

5. Next the machine should be leveled either through the use of shims or leveling bolts under the legs until the two main carriage shafts indicate the machine is level both ways. This is absolutely necessary for good results. Care should be taken that the leveling of the machine is permanent and that it will not be disturbed if the machine is bumped or moved slightly. Use a bubble level to check this.

6. Next the two P-437 mower support shafts can be placed in the castings on the end of the P-435 hand lever support bars as shown in Fig. 1. You will note that on one end of the P-437 mower support shafts there is a V notch cut while on the opposite end there is a hole into which the cone pointed support can be fitted. Also the bed knife holding bar attachment slips into these holes and either end of them can be used. Their use will be explained further on in this book.

7. You will find in your box of assembly parts the

weight feed assembly. This can be slipped over the shaft which extends through the sprocket at the back, left-hand side of the machine. The weight feed is designed to engage or disengage from the sprocket. When the assembly is fitted over this shaft you will notice a flat place milled on the shaft for the holding screw to tighten against. This supports the short arm of the assembly which extends out to hold the cable connecting the feed weight. For the time being leave this weight feed pulley disengaged from the chain sprocket.

8. Next remove the grinding head assembly from its box and place it on the two main carriage shafts. Connect to the grinding carriage the stop bar to which the chain is fastened and which has been wired fast at the back of the machine. The stop bar also has a hold down bearing which runs underneath the track shaft. This bolts to the underside of the grinding carriage base through two holes which are provided and has been adjusted at the factory so that when the two cap screws are put in place, and this stop bar assembly secured, your machine will be completely assembled and ready for use.

9. Before operating clean the machine thoroughly with kerosene or gasoline to remove the slushing, rust-preventing oil which has been applied to all machined and non-painted surfaces of your Peerless. When this is done, recheck the machine for levelness. Remember it must be leveled in two directions. Level the main shafts and finished surfaces of both frames so that they will not

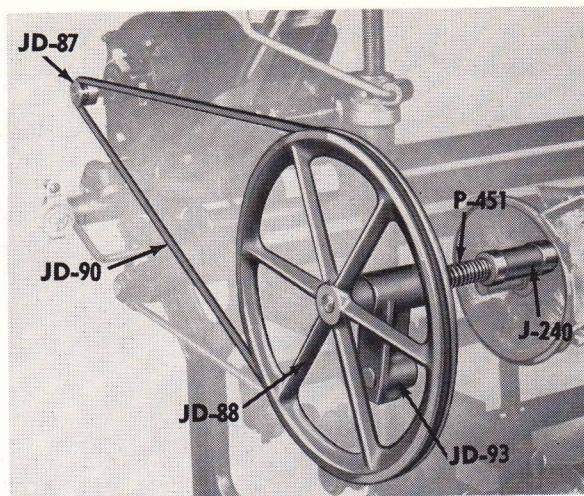


Fig. 3

be in a twist. We repeat at this point to emphasize the importance of having your machine properly leveled before operating.

10. Note that the two main shafts which carry the grinding carriage assembly have a support in the center equipped with two adjusting screws which make contact with the under sides of the shafts. This support is locked. The tension of these adjusting screws has been pre-set at the factory and should not be disturbed at this time. Instruction for the alignment of the carriage shafts will be given further on in this book.

11. Make arrangements for your motor cord to plug into an outlet so located that the cord will not interfere with the travel of the grinding carriage to either end of the machine. An overhead outlet usually works the best, however it is not absolutely necessary as long as the cord does not become fouled while the carriage is grinding. If it is necessary to use an extension cord or lamp socket be sure that the wire leading to the socket or cord is at least #12 so that the motor will be sure to receive sufficient power.

The motor will not perform as rated if the wiring is too light. We recommend that at least #12 wire be run to within ten feet of the machine and the voltage at this outlet should be checked to see that it is not less than 100 volts.

12. Now is the time to determine if any parts are missing from your Peerless, check against Fig. 1, and 2, and the complete parts list for your Model 600. These illustrations cover the Model 600 Peerless complete so if you ordered your machine other than complete this will have to be taken into consideration. The reconditioning attachment consists of a large drive pulley and shaft, and a round endless belt for driving same from the left hand side of the motor. In addition you should have with this attachment one coupler J-240, three sizes of bushings for the J-240 coupler, two driving sockets and one socket driver which will accommodate various sizes of tool box sockets, and two pints of lapping compound, fine and medium grit, making up this assembly. Fig. 1, shows these loose parts in the tool tray provided at the right hand side of your machine.

13. If your machine is ordered complete with the bed knife grinding attachment you will want to check the parts for this attachment which are shown in Fig. 1. In addition you will have the two extra large V-rests for use on your mower supports and two offset V-rests for holding reels being ground separately. Also you should have a telescoping gage which is used to set the distance of a reel or mower the same at both ends from the front main carriage shaft. This gage telescopes in and out and can be set to stay in one position. The remaining two unconnected parts are the roller jack and the roller rest jack support pipe which were wired in place across the front of the machine.

INSTRUCTIONS IN THE EVENT OF DAMAGE

14. Your Peerless is covered by our guarantee which is printed on the back of this book. This guarantee covers your machine for one year against defective material or parts, however it does not cover anything damaged, broken, or missing as a result of improper handling while in shipment. We cannot replace items broken in shipment free of charge, you must file a claim. If anything in this shipment is damaged, broken or missing, follow these instructions at once. Inspect the shipment, if possible, while the expressman, railroad agent, or truck driver is present. If damage or loss is discovered later on, notify the agent for the carrier at once, either the express, railroad, or truck line agent. Make out a claim through the proper agent for the amount of the loss or damage and order from us the parts that are needed to repair the damage or loss, we will ship promptly. We cannot make good the loss or damage at our expense, you will be reimbursed for the amount of your claim by the carrier.

All shipments leave our factory in good condition. crating and shipping cartons are of an approved type, and normally all shipments will reach you in good condition. However rough or improper handling in shipment may cause damage or loss for which we cannot be responsible so please do not request that we make good damage done by the shipper, we will ship replacement parts promptly but we must charge full price for them. Also do not request that we file a claim for you, it is not possible for us to do this. The shipment, by law, becomes your property when it leaves our factory and is turned over to the carrier, it is your property if damage occurs in transit, and only you can file a claim covering it. Please follow these instructions and damages, if any, will be paid by the parties responsible for them.

Shipments by Express, Railroad, or Truck are insured by the carrier and any damages or loss are covered by this insurance, all you have to do is file a claim.

INITIAL ADJUSTMENTS

15. Your Model 600 Peerless Grinder is shipped as completely assembled as it is possible for us to make it. All adjustments, checking, etc., have been completed on this machine before it left our factory. The machine was completely assembled and tested and therefore there remains a minimum of assembly and checking for you to do. Your guide rails have been checked by an accurate indi-

cator and your grinding head is travelling across the width of your machine to within one thousandths of an inch (.001) at the same indication on one side as on the other. In the center by means of the shaft support adjustment, we have made provisions for you to obtain a crown of a few thousandths higher at the center than on the ends. This means in grinding a reel or bed knife the center of said reel or bed knife is a few thousandths higher than the ends. This slight crowning is desirable and many manufacturers of mowers crown more than this at the time of manufacture. This would only apply using the straight line grinding principle. Where the hook grinding is used and the bed knife of the lawn mower becomes the guide, then all grinding accuracy is in exact relation to the bed knife and its straightness. A slight crown where the hook grinding is used would have no effect as only the bevel would be varied by less than one hundredth of a thousandth in the center. This is further explained in paragraph 18.

16. The horizontal and vertical adjustments should be run to their full extreme to determine if operation is smooth. All other movements and adjustments should be checked for proper operation. The machine operation will be covered in the next chapter.

LUBRICATION

17. The necessity of lubrication has been minimized on your Model 600 Peerless. All bearings used are the anti-friction type and the lubrication is sealed into them for life. This includes the motor bearings. The two guide rails which are turned, ground, and polished, high-carbon steel of $1\frac{1}{4}$ " diameter, should be kept dry while the machine is in use as there is a certain amount of grinding or emery dust in the air which settles on the machine. This dust mixed with oil forms an abrasive compound which would damage the shafts and the only time they should be oiled is during extended periods of in-operation. These guide rails are supported by castings P-450 at either end and are held with a set screw. This set screw is provided so that these shafts may be rotated to prevent wear in one spot and thus provide new wearing surfaces as needed.

Other points that we recommend be oiled, especially when new, are the elevating screws which are actuated when the P-424 nuts are turned, also the P-437 Horizontal adjusting screws.

FUNDAMENTAL PRINCIPALS

18. To fully understand the sharpening and grinding of lawnmowers it is felt that the actual job can be better mastered if the full understanding of the various methods and principles of sharpening are thoroughly understood. To appreciate your Model 600 Peerless you should know that you have incorporated in this machine all of the known and accepted principles of lawnmower sharpening. They are, basically, the hook grinding principle and straight line principles, with variations of each. The hook grinding principle is probably the most popular method used and is the only principle used on the Model 600 Peerless little brother, the Ideal machine. With this principle the reel blades are ground to fit the bed knife

or straight blade. Of course, the bed knife is first ground and then replaced in the mower and becomes the guide for the grinding head while the reel blades are being ground. This guide is made possible by the use of a hook which is engaged under the front cutting edge of the bed knife and slides along this surface, controlling the grinding head. The reason that this principle has proved so popular is simply that on hand mowers and power mowers, up to and including the smaller home type power mowers, the bed knife is often distorted from the true straight line to which it was ground, when it is bolted back in the lawnmower and the pressure of the adjusting screws is exerted upon it. Should a slight distortion occur, the reel is ground to fit and a perfect match is obtained. In the old days when materials and designs were not as good as today, the hook grinding principle was practically a "must" on all mowers. Today the larger heavy-duty mowers can be successfully ground with the straight line grinding principle. However, the hook grinding principle will work equally as well, for if the straight blade or bed knife is not distorted, so much the better, the reel will be ground to a straight line and perfect match. With the hook grinding principle it is actually possible to grind the reels of lawnmowers without grinding the bed knife, regardless of their condition, and many people have been "hood-winked" into a fast, cheap grinding job by some who do not remove and sharpen the bed knife as it should be when a mower is in need of grinding. Some manufacturers actually "crown-grind" either their reel or bed knife so that they are high in the center to take up the distortion caused by the adjusting screws. This is their only method as they do not hook grind in their manufacturing process, due to production reasons, and more will be said about the "crown-grinding" principle later.

(b) STRAIGHT LINE GRINDING

The straight line grinding principle is just as the name would suggest, and can be done on your Peerless without any changing, tearing down or setting up. With this method the bed knife is removed and ground, as it would be with the hook grinding principle. However, it is not replaced in the mower until the reel has been ground to a straight line. Then it is replaced and fitted up. The reels can be straight line ground in two manners! either they may be entirely removed from the mowing unit and placed into your Peerless on supports provided, or, they may be left in the mower frame and allowed to rotate on their own bearings while the mower is placed in the machine and the reel ground to a straight line.

(c) CROWN GRINDING

Should the principle mentioned above, of slightly "crown-grinding" the reel or straight blade be desired, your Peerless has center supports for the carriage rails which makes this possible. These supports have been pre-set at the factory so your machine grinds exactly true, or on a straight line. By tightening the front shaft center support this shaft can be slightly humped to produce a crown-grind result. This particular method is not recommended. However, it is preferred by some, and your Peerless is capable of producing that type of a job if desired.

Also, your machine is capable of cylindrically grinding or spin grinding, as it is sometimes referred to, by simply connecting the reconditioning or lapping attachment to the reel shaft, and by using another motor to power the lapping attachment the reel may be spun while you crank the grinding head back and forth slowly and grind the reel by the cylinder or spin-grinding method. The crown results can be obtained with this method also, if the shaft is so set by the center support.

(d) This covers practically all the accepted and known

MACHINE OPERATION

19. Fundamentally the Peerless lawnmower sharpener consists of a frame work that supports an adjustable platform on which a lawnmower rests while the motor driven grinding wheel assembly moves from side to side on tracks grinding the reel blades to fit the bed knife; or the bed knife itself while being supported in the attachment provided; or, when desired, a reel mounted either in the supports provided or the mowing unit itself in its own bearings.

20. Most of the operating controls function to position the lawn mower bed knife or reel with relation to the grinding wheel assembly so that the reel blades are in proper relation to the grinding wheel as it travels along the edges.

21. We will first outline instructions for grinding a mower by the "Hook" grinding principle since this also covers the steps for positioning a mower for straight line grinding as well. For "Hook" grinding, the bed knife must first be removed, sharpened, replaced in the mower, and properly adjusted to the reel blades without actually touching the reel blades.

22. The Peerless sharpener must be level and solid on the floor and the lawn mower must be resting securely on the supports provided on the adjustable platform. The bed knife relationship to the grinding wheel must be adjusted to the position which makes equal contact with the grinding wheel at both ends of the reel blade.

23. After preparing a lawnmower for grinding, the following operating controls fall into three groups in "Grinding the Reel Blades". (1) Placing the lawnmower on the best suited set of three sets of mower supports provided on the adjustable platform so it is resting securely. (2) Adjusting the platform so the Bed Knife is properly positioned to guide the "Grinding Head" while it sharpens the Reel Blades. (3) Setting the Grinding Head controls so each reel blade is positioned to be ground properly.

NOTE:

Compensating adjustments to align the mower for sharpening are made after the grinding has actually begun. Positioning of the grinding head so that the hook (#1, Fig. 4) extends approximately $\frac{1}{8}$ " under the bed knife when engaged may be accomplished with the horizontal adjusting screws actuated with the P-230 hand wheels located on either side of the adjustable platform shown in Fig. 1. Of course the mower is first leveled to be square with the

principles of reel grinding, except possibly the "backing-off" principle, which is merely a secondary clearance or bevel ground on the extreme heel of the reel blades to thin them down slightly when they are worn down to where the metal is of a greater thickness. This is usually done after the reel has been ground and the secondary cut on the steel is seldom allowed to come closer than $\frac{1}{16}$ " of the cutting edge, and some judgment must be used or the reel blade will be thinned and weakened to a point beyond its capability of doing the job for which it was designed.

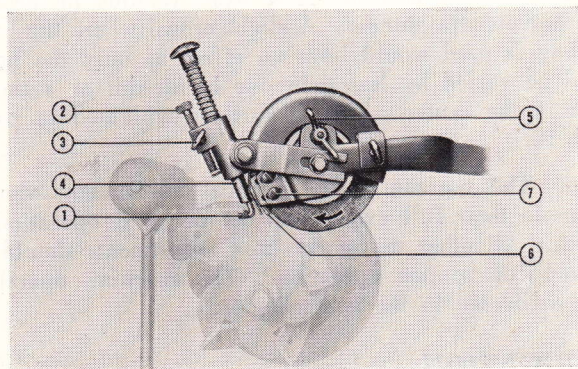


Fig. 4

machine and then the only other possible adjustment necessary for the machine operation would be to raise or lower the roller rest support to bring the bottom surface of the bed knife level or slightly above level. In the leveling operation it may be necessary to use the elevating adjusting screw crank located on either side as well as one of the three different positions provided for this adjustable mower support post.

24. The machine operation could be condensed and described as primarily removing the metal from behind the shearing edges of both reel blade knives and bed knives thereby producing a new sharp shearing edge by the use of a grinding wheel.

OPERATING CONTROLS

25. MOWER SUPPORTS "POINT" AND "V" RESTS (Fig. 1). Two mower support castings, P-449 of the cantilever type gravity-rest are free to be moved side ways on their supporting bars, with their pointed ends supported under a rear bar. Their front ends are formed to hold a mower support shaft which is provided with holes to permit three positions of elevation and can be reversed to bring either end of the mower support shaft up. They can further be provided with pointed rests, V-type rests, or a set of offset V-type rests used for separate reel grinding. These supports are inserted in the castings formed to hold them and we suggest that stopping pins be placed in the middle as shown in Fig. 1. They can be locked in position by tightening a thumb screw.

26. ROLLER REST ASSEMBLY — The Roller rest in Fig. 1 is adjustable up and down by compressing the thumb trigger and raising or lowering the rest assembly

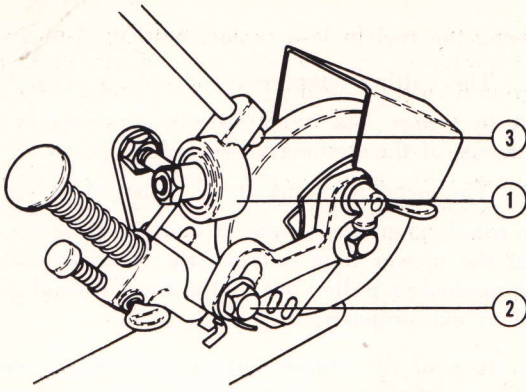


Fig. 5

manually. The roller rest can be placed at any position on the roller rest supporting pipe which in turn is supported by the "V" rest at either side of the machine. The two supporting pipe V-rests are movable forward and backward on their sliding support frame and can be locked in position by tightening the thumb screws.

27. GRINDING HEAD AND CARRIAGE (See Fig. 2). The carriage which travels from side to side on tracks cannot be moved forward or backward. The center of these track shafts are supported by adjusting screws which have been set at the factory for perfect straight line alignment. As explained in paragraph 18, under Fundamental Principles, these screws can be used to arch the track shafts slightly at the center for crown grinding.

28. GRINDING CRANK. The adjustable frame on which the lawn mower rests is moved up or down on either side (using the opposite side as a pivot) by turning either of the two elevating cranks — J-351, Fig. 1.

29. HORIZONTAL (FORWARD AND BACKWARD) ADJUSTING CRANKS. The two cranks (P-230, Fig. 1) are turned to move the adjustable platform away from or toward the operator. Either crank moves its side of the adjustable platform in or out with the other side acting as a pivot.

NOTE: The adjustments described above function to position the mower to be ground with respect to the "Hook" (#1, Fig. 4) and are termed the secondary or fine adjustments. These are made after the primary adjustments such as the height of the mower supports and the height of the rollers rests support have been made.

30. FEED CONTROL SCREW (See Fig. 4). The hook (1), which holds the grinding unit in position with relation to the reel blades, is adjustable vertically by the feed control screw (2). A thumb screw (3) locks the feed control screw after it has positioned the hook or has increased the feed while grinding. The hook is removable or can be adjusted in or out to increase the range of the feed control screw (2). The hook is held in place by an allen set screw (4).

31. FINGER POINT HOLDER. By loosening the wing nut (#5, Fig. 4). The finger point (6) can be rotated around the grinding wheel to engage the front edge of the reel blades and hold each one in a set position so the proper bevel or angle is ground on it.

GRINDING UNIT MAINTENANCE AND ADJUSTMENTS

32. GRINDING WHEEL DRESSER See Fig. 5. (Optional at extra cost). The diamond dresser and holder (1) are mounted on the left hand side of the spreader bolt (2) and is held in place by a large wing nut. The first time this assembly is mounted on the Peerless it must be adjusted to fit. The diamond point dresser (3) must be in line with the middle of the face of the grinding wheel and pointing toward the center of the wheel. Otherwise, the crown of the grinding wheel will be off center. This is accomplished by loosening the two holding nuts on the eye bolt which holds the dresser pivot and adjusting in or out, back and forth, while the dresser holder is centered. The grinding wheel dust guard must be removed before using the dresser assembly. Note: The diamond dresser holder assembly is not standard equipment with the Peerless Sharpener, but is available at extra cost, as some shops have means of dressing down a worn grinding wheel. This unit is not included in the price of the Peerless.

33. FINGER POINT AND SPREADER ASSEMBLY (See Fig. 4). To compensate for the reduction in diameter of the grinding wheel due to wear (and dressing to retain a crown) the finger point screws (7) are loosened to permit the finger point (6) to be moved closer to the wheel. The finger point should be as close as possible without touching the high point of the crown. This adjustment is usually made after the wheel has been dressed two or three times to restore the crown.

34. After the finger point has been adjusted to the wheel a few times, it will become necessary to adjust the hook and hook shaft closer to the grinding wheel. This is done by loosening the spreader bolt (8) and moving the hook shaft in until it just clears the finger.

35. "V" DRIVING BELTS. The grinding wheel belt is tightened to compensate for stretch and wear by slightly loosening the four bolts that hold the grinding wheel arm fork to the carriage and then moving the grinding arm fork out to adjust the belt to its proper tightness. While the belt is held in its new position with the alignment checked, the four bolts are tightened. The jack-shaft belt is tightened by moving the motor backwards after loosening the four bolts that fasten the motor base to the carriage.

36. CARRIAGE SUPPORT BEARINGS. The front of the carriage on your Peerless rolls on two ball bearings, making a four-point contact for the carriage with the two carriage shafts. The one front bearing is mounted on an axle which is eccentric, and your machine was set up level at the factory with the bearings adjusted so that they all contacted the shafts and carried an equal share of the weight. When your machine has been leveled, per previous instructions, the carriage should be set on the carriage shafts with all bearings contacting equally along the entire length of the carriage shafts. Should you find that either one of the two front bearings are not tracking as they should, this may be adjusted by loosening the set screw which retains the bearing in the axle, which, being off-center, will give a slight vertical adjustment of the left hand bearing.

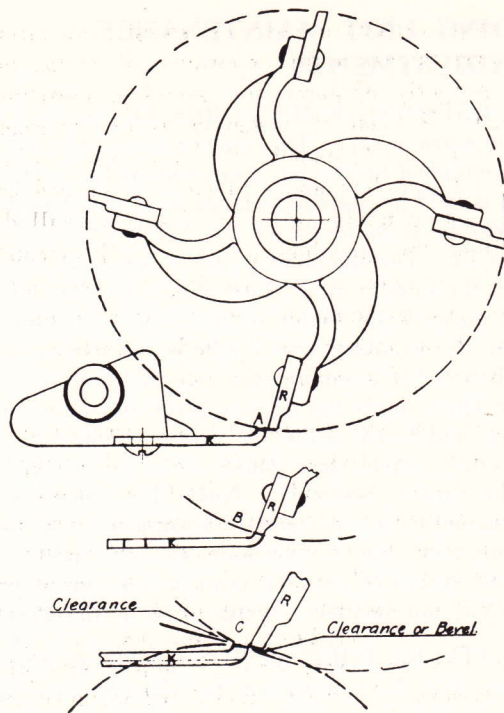


Fig. 6

37. **CARRIAGE SHAFT TRACK.** After years of service the carriage shafts, P-460, Fig. 1, may develop flat surfaces under the carriage bearings. By rotating the tracks, the bearing wheels travel over new surfaces reducing wear on any one spot. Rotate the shafts periodically, to provide new track surfaces.

38. **STRUCTURE.** Occasionally tighten all the nuts and bolts that hold the frame work of the grinder together and check the machine for proper alignment and levelness.

PRINCIPLES OF SHARPENING

39. Slow motion movies have revealed the fact that lawnmowers using the principle of a stationary bed knife and a rotating reel cut grass by a combination of the motion of a scythe and a pair of shears. Emphasis therefore is on the "attitude" of the stationary bed knife to a stand of grass and the relation of the rotary reel blades to the bed knife. Remember that on a five bladed reel, the bed knife does five times the work of any one reel blade with all reel blades shearing against it. If the reel blades are in need of sharpening, the bed knife will certainly be in need of it also.

There are a great many shapes of bed knives in use and they are mounted in the frames in many different ways but they all have one thing in common: their typical relationship to the rotary or reel blades with which they are matched. This relationship of the cutting edges may have been destroyed by one or more of the following causes.

- (a) The frame of the lawnmower supporting the stationary (adjustable) bed knife and the reel may be loose or may have been sprung in rough usage.
- (b) The reel bearings may be worn through lack of lubrication, dirt, or faulty adjustment

causing the reel to lose contact with the bed knife.

(c) The cutting edges may have been nicked or bent by stones and other objects or excessive adjustments of the stationary bed knife.

(d) The metal parts may have rusted or corroded.

The usual symptoms of one or more of these conditions are that the mower does not operate freely and that the grass is mashed or pulled out by the roots instead of being sheared or cut properly.

40. It is of the utmost importance that the cause of faulty or unsatisfactory mower operation be determined before sharpening. Occasionally cleaning, lubricating tightening and proper alignment, and adjustment of the reel bearings and the bed knife will restore a mower to satisfactory operating condition. If the cutting edges are not too badly worn or nicked a small amount of "lapping" on the reconditioner attachment after the above adjustments are made will restore the mower to satisfactory cutting condition.

41. The process of sharpening a lawnmower is really one of reshaping the cutting edge of the bed knife and the rotary reel blades by grinding, to restore their ability to cut grass. Equally important is the restoration of the match, or fit, of the reel blades to the cutting edge of the bed knife, against which all reel blades shear or cut.

42. For a mower to run easily and cut freely, it is important that proper bevel or relief angle be ground on both the bed knife cutting edge and the reel blades cutting edges. This gives clearance or relief behind the contacting edges and reduces drag and friction. Too little relief angle would leave more metal in contact causing the mower to run hard. Too much clearance or angle would weaken the cutting edges and they would nick easily and would not hold their adjustment.

43. For production reasons most mower manufacturers spin or cylinder grind their reels. With this method the reel is revolved on centers or on its bearings while a large grinding wheel passes back and forth grinding the reel to a true cylinder. No bevel or clearance is given to the reel blades and the entire thickness of each blade makes a rubbing contact with the bed knife. The manufacturers do put clearance or bevel on the bed knife, otherwise the mower would run too hard to sell even as new.

44. This is why a new lawnmower, especially a hand mower, can be improved by grinding the reel blades on the Peerless Sharpener. Only when the reel blades are ground one at a time can each blade be given a bevel and thus a desirable clearance behind the cutting edge (See Fig. 6). A power mower does not need as much clearance as a hand lawnmower as they need not be pushed and the cutting edges need extra strength which results by decreasing the clearance angle.

45. The foregoing has explained why a new lawnmower will soon be in need of sharpening. The wide contact of each reel blade soon wears off the clearance ground in the bed knife making the area of contact excessive. This causes harder pushing or running as the bed knife is adjusted tighter and tighter against the reel blades to main-

THE FATE-ROOT-HEATH CO.	
Mower Parts Div.	Plymouth, Ohio
Date _____	
Name _____	
Address _____	
City _____	Phone _____
Promised by _____	
INSTRUCTIONS	
<input type="checkbox"/> Sharpen _____	
<input type="checkbox"/> Recondition _____	
<input type="checkbox"/> Repair _____	
Labor _____	
76950 Total \$ _____	
76950	
Handle or Motor Identification Stub	
CLAIM CHECK	
76950	
<i>Thank You</i>	

Fig. 7

tain some semblance of cutting action. Actually the cutting edges become rounded and the grass is no longer sheared off but pinched off if not pulled entirely out of the ground. Many lawnmower shops that sell new mowers now grind the reel blades and readjust a new mower before delivery to assure customer satisfaction. Some manufacturers have resorted to a thinner reel blade, however this is not entirely satisfactory as a blade thin enough to push easily would not have the strength to withstand the service to which it would be submitted.

46. The Model 600 Peerless Lawnmower Sharpener does a precision job of grinding a lawnmower reel to fit its bed knife, resulting in equal contact of all the reel blades with all points of the bed knife. It is of utmost importance that the lawnmower be properly prepared for grinding. The preceeding material has dealt with theory and principles and was not intended as a specific

step-by-step instruction covering specific operation. We cannot over-emphasize the importance of having the lawnmower properly prepared for grinding, particularly the alignment. We take each step in its proper sequence in the following pages, namely, the preparation of the mower, removal, grinding and replacing of the bed knife, using the hook grinding principle. Later we will deal with the straight line grinding principle, adjustments of the bed knife preparatory to grinding the reel blades, the operations for grinding the reel, the final setting and adjustment of the mower, the methods of testing and checking to be sure of a satisfactory job.

47. If you are completely inexperienced in the operation of a lawnmower grinder, we will attempt to give each step as simply and completely as possible, so the most inexperienced mechanic or user of this equipment can train himself without assistance to master the machine operation and the grinding of the lawnmower. If you have had experience, many of these instructions will be over-explained, but bear in mind that they are for the operator who has never had the opportunity of service and experience. To the inexperienced we must warn that these instructions may seem rather complicated. However, as you develop the know-how and the experience you will find many short cuts and many of the specific points will be done as a matter of second-nature.

48. CHECKING THE LAWNMOWER BEFORE SHARPENING. A typical customer's claim check and mower identification tag is shown in Fig. 7 as a guide for lawnmower repair men and service shops who want to establish or revise an accounting system. To the golf course or park superintendent a few of these tags can be readily used for a service record or to give specific service instructions to the machine operator or mechanic who later services the mower. These tags when properly filled in and filed provide you with a complete record accounting system, list of customers' addresses, phone numbers, record of work done, date of last sharpening, and any other information you may wish to record. You can use this customer's list to your advantage in the fall and winter by offering to pick up their mowers, provide winter storage and sharpening for spring delivery. This would increase your off-season business and leave you free to go after new business in the Spring.

When a lawnmower is brought to you for sharpening or winter storage, the following checks should be made, in the presence of the customer if possible, and the condition of the mower recorded.

49. CONDITION CHECK LIST. This provides a sound basis for charges to be made as well as a record for future reference. Notes on the condition of the mower and work customer wants done should be written on the large part of the identification tag to guide you when the mower is being serviced.

(1). HANDLE. Check for broken welds on steel handles, or splits on wooden handles. Note if cross arm is loose. Make a note on the tag if the handle was not brought to the shop with the mower.

(2). **ROLLER.** Check for split or worn (undersized) roller and loose pins. Also check the roller hangers for excessive wear or breakage.

(3). **PINIONS AND PAWLS.** Turn the wheels vigorously by hand to see if the reel is positively driven. If there is slippage, the customer should be advised that new pinion gears and pawls may be needed and the approximate cost of the repairs.

(4). **FRAME.** Check that the front spacer bar and the bed knife are fastened securely and that the frame in general is not loose. If the frame is loose, it is probably out of alignment. Examine the side plates for cracks and look for stripped threads on the bed knife adjusting screws.

(5). **BED KNIFE.** Check and determine if the bed knife has enough body to grind or if it should be replaced with a new knife blade. Also check general condition of the cast back and pivot points.

(6). **REEL.** Check the reel for proper (free) rotation on its axis (bearing races) and examine the reel blades for bad nicks that might indicate a twisted or sprung spider. Check to see that reel blades are securely fastened to the spiders and that the spiders are secured on the reel shaft. A sprung reel blade can be forced back into place rather than resorting to excessive grinding to restore it.

(7). **WHEELS AND TIRES.** Check for excessive end play or wobble. Wheels may be broken or cracked and tires may need replacing due to wear. Cleaning grease and grass out of the ring gear of the wheel may make the drive more noisy but should result in easier operation. You can take your choice on cleaning the ring gear, however when new pinions are installed, the ring gears should definitely be cleaned.

(8). **REEL BEARINGS.** Check for vertical or end play of the reel due to wear or improper adjustment of the reel bearings or pitted cups and cones. If the bearings are loose or worn and are of the non-adjustable type, new ones will be needed and their cost should be taken into consideration.

(9). **CLEAN AND TOUCH UP.** Most owners appreciate clean machinery and will gladly pay to have their mower thoroughly cleaned and exposed parts painted.

NOTE (The following applies only to power lawnmowers)

Discuss the condition of the engine with the owner and, if necessary, start the engine and check its operation. If you do not work on engines yourself and it is in need of attention, offer to remove the engine and have the necessary work done by a garage or authorized service station for that make of engine. A working agreement should be established allowing you a percentage for work you bring in.

(10). **STARTER.** Examine the starter for broken or bent parts that indicate the need for repairs or adjustments. Note if starter rope was brought in with the mower. If a new starter rope is needed, supply one free of charge for good will. They are easy to make out of

clothesline rope and dowl rod and will be appreciated by your customer.

(11). **IGNITION SYSTEM.** Ask how engine has been starting. If service is indicated, check spark plug, wiring and magneto points.

(12). **FUEL SYSTEM.** When the gasoline tank has been removed or drained as is recommended, this offers a good opportunity to check the fuel system, air cleaner and muffler, which should also be inspected for satisfactory conditions. Note: many shop operators cover the vent hole in the gas cap with a piece of tape, and thus enable them to invert their mower and leave the fuel in the tank. However, this is optional and the operator should be governed by his own working conditions, fire hazards, city ordinances, etc.

(13). **LUBRICATION.** If the lawnmower is turned upside down for grinding, the crankcase oil will have to be drained. The average engine holds one pint or less of oil and you should refill it with new oil. Advise your customer that your charge includes an oil change. They will be pleased with this additional service.

50. GENERAL CONDITION OF MOWER. In conversation with the owner you can learn a lot about the condition of the mower and its serviceability. Perhaps it has had unusually hard use and lacks power which might indicate a complete overhaul. Perhaps a hand mower should be replaced by a power mower or a power mower should be replaced by a larger or later model. If you are in a position to sell new mowers, this is your golden opportunity to do so.

51. On most mowers it is not necessary to remove the handles, they can be left in place during the sharpening operation. However a mower in bad condition can be worked on with more convenience if the handle is removed since it can be turned over and up on end for repairs and adjustments. Loose bearings, misalignment, sticking wheels, wire or grass tangled reel shaft, and exceptionally dirty condition are a few of the things that must be remedied before a mower can be ground. You can decide if these conditions can be most conveniently remedied with the handle on or off. As far as the operation of the Peerless is concerned, it makes no difference.

52. The same is true for power mowers. They can be sharpened in your Peerless Sharpener while completely assembled, engine, handle and all. However if there is any amount of repair work necessary, it will be more convenient to dis-assemble them. If possible, we recommend that the deckplate, which holds the engine and sometimes the handle, be removed from the mower with other parts intact. If the handle fastens to the side plates of the mower, remove the throttle and other controls from it and leave these controls attached to the engine. By removing the deck plates and engine with the controls attached, you will have no trouble in re-assembling the mower.

53. You will find it much easier to prepare a mower for sharpening if it is placed on a work bench. We recommend that all mowers be placed on a bench for preparation and for the final assembly and adjustment. A special

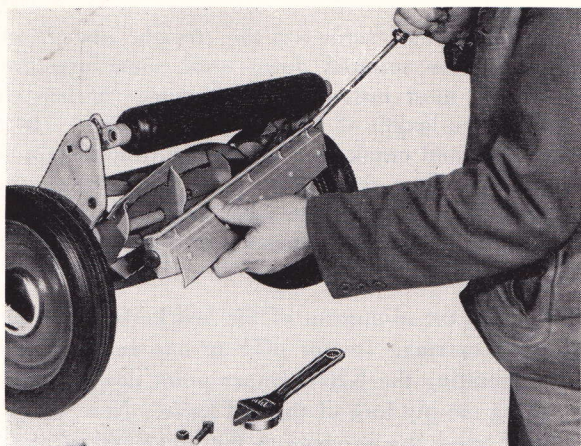


Fig. 8

wide work bench in the center of the room is convenient for this work since you can work on the mower from any side.

REMOVING AND GRINDING THE BED KNIFE

54. It is impossible to cover the exact steps and procedure necessary to sharpen every different make and model of hand and power lawnmowers. You will have to use your own ability, and sometimes ingenuity, in following our general instructions and applying them to many different types of mowers.

55. The first step in the sharpening procedure is to remove the bed knife (sometimes called the straight blade, cutter bar, stationary blade and other names, we shall refer to it as the bed knife) from the mower. Most bed knives are held in the mowers by cap screws or nuts and bolts through the ends of the bed knife cast-back and the side frames of the mower. Relieve the pressure or tension on the bed knife adjusting screws before removing the end bolts. Put a few drops of oil on all screws or bolts removed or loosened, this will help in re-assembling and adjusting and will prevent rust. This practice will also make mowers easier to work on when brought to you for future sharpening jobs. After the cap screws or bolts are removed, use a large screwdriver or pinch bar to spring the side frames from the mower apart so that the bed knife can be removed (See Fig. 8). Some mowers are constructed differently and the above procedure would not fully apply. However after you have worked on a few mowers, you will be able to remove any bed knife, no matter how it is constructed, in a very short time. Be very careful that excessive pressure in springing the side frames is not used as there are cases where it will be necessary to relieve the bearing pressure on the reel to gain enough movement on the side frames for the removal of the bed knife assembly. On heavy duty mowers, most bed knives are easily removed without the necessity of springing the side frames.

56. After the bed knife assembly has been removed, it should be cleaned and inspected. A screw driver or putty knife and a wire brush will prove effective in removing the dirt and grass that accumulates on the knives behind the cutting edge. The blade must be cleaned before

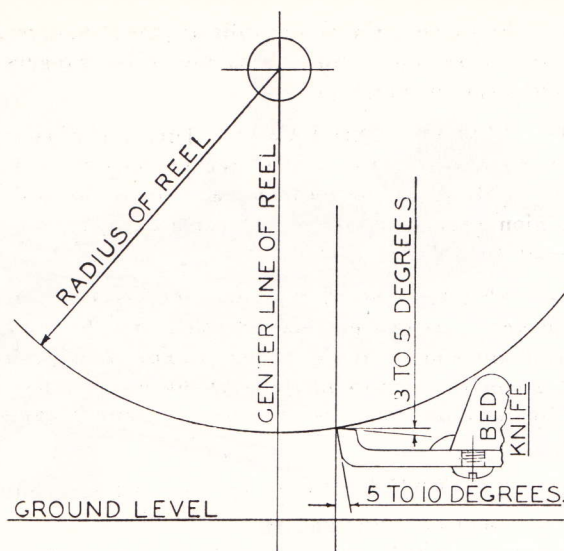


Fig. 9

it is ground. It should be noted if there is a wavy appearance or condition along the top face of the bed knife. This would indicate that the bed knife has been adjusted to the reel with excessive pressure, or the reel bearings have excessive play or looseness, also the contacting area of the top face edge made by the reel blade should be noted, as you can observe the amount of contact the reel blades were making with the bed knife, and if it is excessive and across the entire width. You will also notice that the front cutting edge has become round, and it would be difficult for grass to be sheared off by the reel blades against this edge. If improper adjustments have been made on the mower, there is likely to be more lip on the bed knife at one end than at the other. Usually there is a small part of the bed knife which extends beyond the reel blades and you can judge the amount that has been worn away on the lip by this area that has not been contacted. If there is a difference in the amount of lipped area it is advisable to compensate for this in grinding by removing more metal at the thick end to bring the knife back to an even thickness and eliminate any twisting of the bed knife in the final adjustment to bring the reel in contact with all points of the bed knife. In restoring the bed knife to a sharp cutting edge and eliminating the roundness of the front edge it will be necessary to grind the front edge as well as the top face. By grinding some on the front edge a sharp square corner can be reached when grinding the top face without removing so much metal where it is needed the most. If the edges are extremely rounded and dull it may be advisable to remove a little more metal from the front edge as this area is not subject to wear or contact by the reel knives.

57. Fig. 9 illustrates the angle and relationship of the bed knife to the ground and to the diameter of the reel blades. There are exceptions to this illustration but this is the more general type that will be found. In all cases the front edge of the bed knife should be ground first. The wire edge left from this grinding will be removed when the top face of the bed knife is ground. The front edge can be ground perfectly square. However, as the illustration in Fig. 9 shows, an angle of 5 to 10 degrees is de-

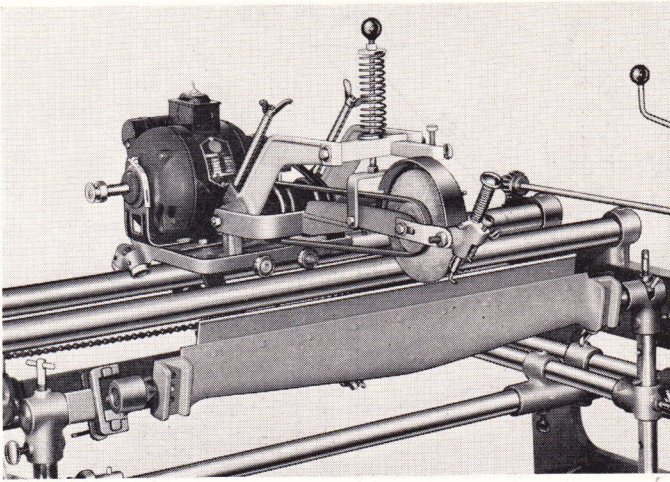


Fig. 10

sirable. After the front edge has been ground the top face edge is ready to be ground, and referring again to Fig. 9 a perfectly level or square grind would provide some clearance. However, an angle of 3 to 5 degrees is preferable to assure a proper clearance or relief behind the cutting edge. When grinding these surfaces take a light cut part way across and then examine the points of contact of the grinding wheel. Be sure that you have begun grinding behind the cutting edge on the top face so that you will be assured of clearance, and when you have ground to a new front edge the back edge of the lip will be lower, and the necessary relief given.

58. You are now ready to grind the bed knife on the bed knife grinding attachment of the Peerless. If you followed the setting up instructions carefully you will find this attachment is ready for use by simply placing it on the end of the mower supports and, for this operation, the mower support end with the V notch milled in it should be placed down. We recommend having the mower support shaft extend upward only as far as the first hole as shown in Fig. 10. The holding centers for the bed knife are spaced on the bed knife grinding attachment bar at the proper position to accommodate the bed knife, and the adjustable center is tightened to hold it firmly. The bed knife holding or locking device is on the center of the attachment bar and is now pivoted until the two screws can engage the bed knife and hold it steady to prevent it from rocking on the centers. If the particular bed knife you are to grind does not have holes in the end of it to accommodate these centers, we recommend that you counter-drill a small $\frac{1}{4}$ " hole approximately $\frac{3}{8}$ " deep to provide a method of holding the bed knife assembly with the centers. If this is not possible we would suggest you use the dummy center castings provided to clamp over the end of the bed knives. These centers have the small counter-drilled hole in them to accommodate the centers of the bed knife grinding attachment. With the bed knife securely in place, the entire bed knife assembly can be rotated by loosening the two T-handled screws on either end of the bed knife attachment, so that the front edge of the bed knife is brought up to the proper position, giving an angle of 5 to 10 degrees as shown in Fig. 10. The grinding head of the Peerless is brought down into

position and the feed screw on the straight line grinding control should be screwed down until some pressure is felt on it. In most instances we recommend at least half way, or half the length of the feed control screw. In this operation the hand crank feed is used and the weight feed is released by sliding the jaw coupling out of engagement with the cable drum with the feed weight resting on the floor. This weight feed is located at the back left hand side of the machine.

59. Check the alignment of the bed knife by cranking the grinding carriage (motor off) to one end of the bed knife, and rotating the J-28-C finger point down until it is just touching the top face of the bed knife. Now, using the hand crank, move the carriage to the other end of the bed knife and determine if the finger point which was locked in position is contacting the bed knife at this end the same as it was at the other. If not, the horizontal, or in and out adjustment of your machine, can be used and the bed knife perfectly aligned with the travel of the grinding wheel. Once this is accomplished the J-28-C finger point can be rotated back out of the way, and locked.

60. Again move the grinding carriage to one end of the bed knife and, with the feed control screw, adjust the grinding wheel until it is just contacting the bed knife, with the grinding wheel scratching lightly. Now, move the grinding carriage to the other end of the bed knife and determine if the grinding wheel contacts this end in a like manner. If it does not, it will be necessary to use the vertical adjustment on this side of your machine, positioning the bed knife up or down until the grinding wheel is contacted in a like manner. Again, if much adjustment is needed we suggest you return the carriage to the opposite end and repeat these directions until the grinding wheel is scratching the bed knife at each end equally. You now have the bed knife positioned properly and it is in line with the travel of the grinding wheel.

61. Start the motor and grind the front edge while cranking the carriage back and forth. Feed can be increased if needed by turning the feed screw (S-45, Fig. 2) downward. Continue grinding until the front edge is true and even all the way across with the degree of bevel shown in Fig. 9. With the front edge completed, you are ready to grind the top face of the bed knife as in Fig. 11.

We suggest that the bed knife be rotated to the position shown by loosening the "T" handle locking screws at either side of the bed knife grinding attachment. By using a position as illustrated in Fig. 11, bed knives with projecting ears will not interfere with the grinding head traveling to the extreme ends of the bed knife. When the bed knife is rotated to this position, the bed knife attachment will usually have to be moved closer to the carriage rails of the grinding head. To re-align the bed knives we suggest that you use the telescoping gage provided with your machine to determine if the bed knife is at an equal distance from the front carriage shaft at both ends. This was the same step accomplished in grinding the front edge by using the J-28-C finger as an indicator to the bed knife alignment. However in its present position the finger cannot be used satisfactorily and the adjustable gage will work best. The grinding head should be brought down

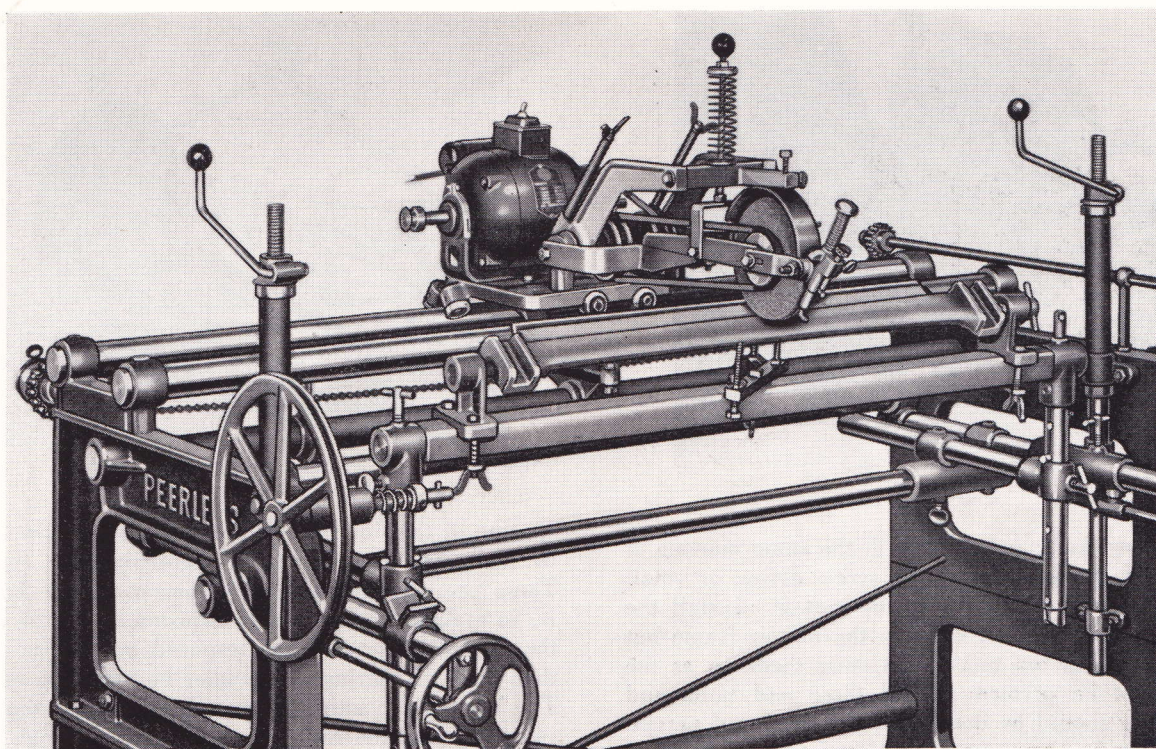


Fig. 11

and the bed knife so positioned that when the grinding wheel scratches it is contacting behind the cutting edge thus assuring the desired clearance. By turning the motor by hand and having the grinding wheel scratch, the contact can be noted and the exact angle, and the amount of metal to be removed behind the cutting edge determined. After the bed knife has been positioned to give the desired results, again the grinding wheel is set to scratch lightly at both ends of the bed knife by using the vertical adjustment cranks located at each side of the machine. When equal contact is being made, start the motor and begin using the hand crank feed and increasing the feed until you have ground down to a new edge the entire length of the bed knife. The bed knife shown in Figs. 10 and 11 is from a thirty inch Toro Fairway unit, and on this particular bed knife it was necessary to drill the small holes in the ends to accommodate the centers which hold the bed knife in position. When a new edge has been reached you are ready to remove the bed knife from the attachment and, in grinding gang mowers or more than one of the same make and model of mower, we suggest that all bed knives be ground before removing the bed knife grinding attachment from the Peerless. This will eliminate the setting up time on each individual bed knife.

62. After the bed knife has been removed from the machine we suggest that a small honing stone or a fine mill file be used to slightly hone or touch up the new cutting edge and remove any slight burr or wire edge that might have remained. If the bed knife and the mower is not to be used immediately we suggest that oil be applied to the ground surfaces to prevent them from rusting. This will further serve to lubricate the sliding of the hook if the hook grinding principle is to be used in grinding the reel blades.

63. Some shops and service men have added the Model 50 Ideal Bed Knife Grinder in their first year of business, some in their second year. Men who are experienced in the lawn mower service field usually order the Model 600 Peerless and the Model 50 Bed Knife Grinder together. The Model 50 eliminates the need for the bed knife grinding attachment on the Model 600 Peerless. However many men have continued to use the attachment where a limited number of mowers are to be ground each year. The Model 50 is a commercial shop machine designed especially for the grinding of bed knives and if the amount of your work would warrant it, it would speed up your production and increase the number of men you could use to service lawn mowers in your shop.

REPLACING THE BED KNIFE AND PREPARATION FOR REEL GRINDING

64. We will now proceed with the replacing of the bed knife and the necessary instructions for preparing the mower for reel grinding as would be necessary with the hook grinding principle. In the event that you do not intend to do hook grinding it would be well to read the instructions anyway, and then proceed further on in the book to the instructions for straight line grinding the reel, either in or out of the mowing unit. We would suggest that you try the hook grinding principle as it will undoubtedly prove very successful on your smaller mowers, particularly hand and home type power mower units. Many owners of the Peerless grinder prefer to use the hook grinding exclusively while still others prefer the straight line grinding principle. This of course will be up to the individual, however we do feel that you should give the hook grinding principle a try to better understand the problems and principles in grinding lawn mowers.



Fig. 12

65. The bed knife is replaced in the same manner in which it was removed, using your screw driver or small pinch bar to spread the frame of the mower. Install the end bolts that hold the bed knife in the mower frame but do not tighten them too much, just snug them up as the bed knife must be pivoted around these end bolts and final tightening should be done after the final and permanent adjustment has been made on completion of sharpening. See Fig. 12.

66. After the bed knife has been bolted into the frame the mower should be thoroughly checked over. To better understand the checking of the mower, one should realize that the basic unit of the reel type mower is composed of two side frames held in position by a spacing bar (sometimes called shrub bar) at the front. This bar is usually located above and ahead of the reel shaft. To complete the spacing of this unit the bed knife ties the other side of the frames together to complete the box structure of the unit. The side frames should be paralalled and aligned through both planes when the mower is assembled. If the front spacing bar should be loose you would have detected it before replacing the bed knife as the two side frames would have moved independently of each other and this should be corrected before replacing the bed knife. However if the bed knife has already been replaced and you find that the front spacing bar is loose, it can be tightened and alignment made with out the removal of the bed knife. Before tightening the front spacing bar the side frames must be aligned with each other. This is done by sighting over the front spacing bar and twisting or moving the side frames independently of each other until the reel shaft is parallel with the front spacing bar. This will assure the proper alignment and the frames should be tightened on the spacing bar, or vice-versa depending on design, with the distance between the end frames the same as it was before the spacing bar became loose. This can be detected by paint markings or other indications as to what the previous setting had been. Now, with the front spacing bar tightened and the mower aligned with the bed knife secured between the frames, the box construction is complete and the reel is turning within this box on its bearings.

67. The reel bearings must now be checked for proper adjustment. This adjustment is dependent on the proper

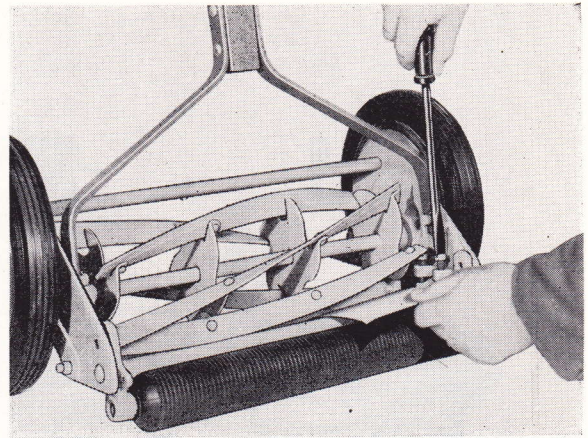


Fig. 13

spacing of the side frames and it could have been disturbed in realigning the mower or tightening the spacing bar. These bearings may also have become loose due to wear. If, in making the alignment adjustments of the shrub bar, the side frames were not respaced exactly as they were, then the reel bearings will either be too loose or too tight. The bearings on either side of the reel shaft should be adjusted so that the reel will turn freely without any up or down movement or end movement. Test your adjustment by grasping the reel shaft with your fingers and, with your thumb resting on the side frame, apply pressure in all directions at right angles to the reel shaft and also endwise. When the bearings are properly adjusted, there will be no movement noticeable at either end of the reel shaft, yet the reel will spin freely for five seconds or longer when the bed knife is not in contact with it. It is advisable to check the bearing adjustments at different positions of the reel so turn the reel to several positions while checking. Sometimes a cracked or pitted bearing will be tight in one position and loose in another so tight and loose conditions while turning the reel would indicate a bad bearing which must be replaced.

68. There are many types of reel bearings used in lawnmowers and most of them are provided with some means of adjustment. Some types are not adjustable and if they are loose, they will have to be replaced with new bearings. Most hand mowers have ball bearings of the adjustable cone type. To take up or adjust these bearings, provision is made to screw the cone into the ball cup or vice versa. Sometimes the cone is threaded on the reel shaft or in the side frame or the ball cup is threaded in the side plate. Other types use a split bearing cone with two pointed set screws opposite each other. To tighten this bearing, loosen one set screw and tighten the other. This causes the split bearing to spread and tighten. Another type is the spring loaded bearing where the spring keeps constant pressure on the cone pushing it into the ball cup. There is no take up adjustment on a spring loaded bearing and replacement need be made only when the spring weakens or breaks or the parts simply wear out. Another type is the roller or needle bearing variety which also have no take up or adjustment except where tapered roller bearings are used. If adjustment cannot be made on loose reel bearings, the bearings must be replaced. Remember that it is impossible to do a satisfactory sharpening job on a

mower if the reel bearings are not in proper adjustment. Any looseness in the reel bearings would have the same results on the grinding of a reel as a loose bearing or center in a lathe would have. It would be impossible to turn anything round and true in a lathe with one end of the other loose and the same is true in grinding the reel of a lawnmower, it cannot be ground true if the bearings have any play. We could go on indefinitely on the subject of bearings and we still could not tell you as much as you would learn by working on a few mowers. The important thing is that the bearings must not be loose when you grind a lawnmower. Also in taking up the bearings, do not get them too tight as the reel must turn freely.

Power mowers today, with a few exceptions, use tapered Timken Roller Bearings on the reel shafts. These bearings seldom need adjustment and when they do, it is very easy to do and would be similar to adjusting the front wheel bearings on your automobile. You simply tighten the nut which holds the tapered bearing and cone in place to take up looseness. The tighter the nut is turned, the tighter the bearing fits and care must be taken not to get it too tight as the reel would then have too much drag.

69. The bed knife must now be adjusted to the reel blades in preparation for grinding the reel blades. It must not touch the reel blades as the reel must be free to turn while grinding, yet it should be set as closely as possible to the reel blades. We recommend that a double thickness of paper or a calling card be used to make this adjustment. Insert the card or paper between the bed knife and the highest reel blade (if any one blade extends out further than the rest) and tighten the adjusting screws until this blade just pinches the paper at both ends of the bed knife. See Fig. 13. It is essential that you have the adjusting screws at this point set just as tight as you want to set them later for grass cutting. The reason for this, and the secret of our hook grinding principle, is that practically all bed knives distort or spring, under the pressure of the adjusting screws and if this distortion is not the same when the reel is being ground as it will be when the mower is cutting grass, there may not be perfect cutting contact between each reel blade and every point of the bed knife. This distortion usually causes the bed knife to bow out in the center and increased pressure would cause it to bow out further, therefore with cutting contact at either edge of the bed knife there would not be cutting contact at the center.

70. By hook grinding it is possible to grind the reel blades to fit the contour of the bed knife under the pressure of the adjusting screws and you can appreciate the importance of maintaining the same pressure on the adjusting screws during grinding and grass cutting. If the bed knife remains straight when clamped in the mower, so much the better and the reel blades will be ground straight to fit it. But if, like most of them, the bed knife distorts from a straight line, the reel blades will still be ground to fit it. This eliminates the need for lapping in. Tighten the adjusting screws with the bed knife pinching the paper on the highest reel blade and keep the same screwdriver or wrench at hand for making final adjustments after grinding the reel.

71. Detailed instructions of the preparation of every

make and model of lawnmower would fill hundreds of pages and would require more time to locate and follow than the application of the average person's basic mechanical ability, especially after working on one or two mowers. Hand mowers are easy and can be handled almost as easily with the handle on or off, as you choose. If you have had occasion to remove the wheels in following these instructions, then we suggest that you leave them off for reel grinding. The mower will be that much lighter and easier to handle.

There is one hand mower made by the Eclipse Lawnmower Company (Model A) which uses a unique method of adjusting the bed knife. An arm extends from the center of the bed knife in a curve to the shrub bar where the adjustment is made with wing nuts. This particular bed knife is difficult to remove from the mower and, if removed, it cannot be ground on either the Model 600 or the Model 50 without removing the adjusting arm. This arm is riveted to the bed knife and if it were removed, the rivets would have to be replaced with nuts and bolts. We make an exception of mowers of this type and recommend that the bed knife blade be removed from the casting or cast-back for grinding. The blade can be clamped to a straight bar of some kind for grinding. This method is much faster and you need not risk breaking the side frames in trying to remove the bed knife assembly. A power mower in this category is the Cooper Clipper which also has a bed knife that is hard to remove. Use the same method as above, remove the bed knife blade by removing the cap screws that hold it to the cast back.

72. If, for any reason, you have to remove the engine from a power mower, try to keep the handle and engine together and don't disconnect the throttle control wire unless absolutely necessary. Wherever possible disassemble by removing the deck-plate, engine, handle, and controls all in one unit and you will have saved a lot of time and trouble in reassembling the mower. If there is no reason to disassemble a power mower then the following steps must be taken before reel grinding: (1) Drain the oil from the crank case. (2) Remove the oil bath air cleaner. (3) Remove or drain the gasoline tank. We recommend complete removal of the gas tank when possible as even a drained tank can be dangerous with grinding sparks flying. (4) Disconnect the chain which drives the reel. Sometimes this chain is covered and you cannot get at it without a lot of dismantling. If this is the case, then leave the chain connected and disconnect the chain or belt from the jack shaft to the engine. The Reo Royale is one power mower on which it is not practical to disconnect the chain drive. The important thing is for the reel to turn freely during grinding and if the jack shaft turns without too much drag, then the chain need not be disconnected. On heavy-duty Park and estate type mowers that have a separate clutch to control the reel, it is usually only necessary to have this clutch disengaged. (5.) Any obstruction that would prevent the grinding head and hook from traveling to the extreme ends of the reel blades must be removed. On the Jacobson Lawn Queen, for example, are two reel guards held with screws, these must be removed. On the Reo Royale it is necessary to remove the right wheel and wheel plate, but on most mowers there is nothing to

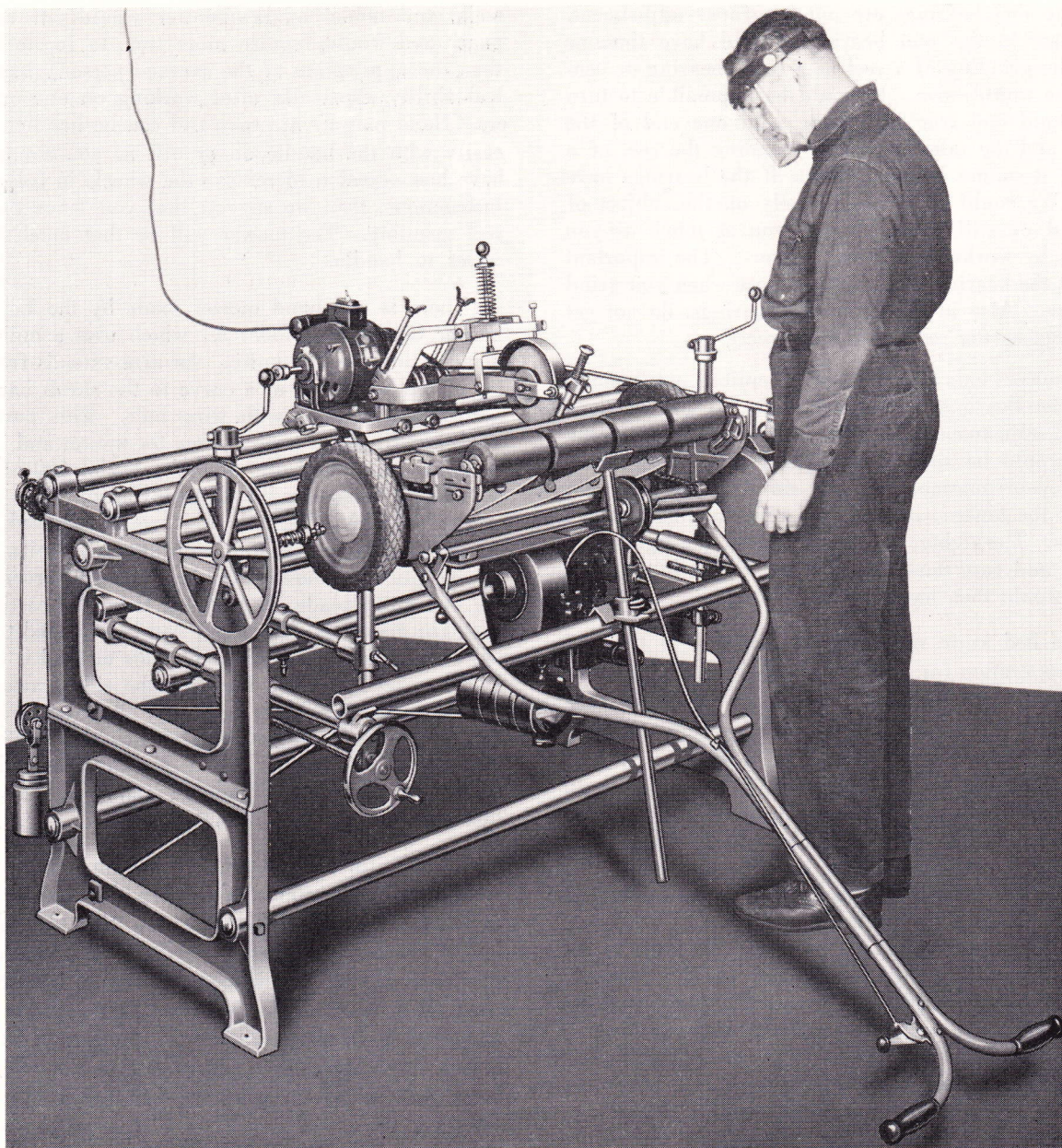


Fig. 14

interfere with the hook. (6.) The deck-plate on most power mowers covers the shrub bar completely leaving no bar or shaft exposed on which to support the mower with the standard "V" rests. It may be necessary to drill two holes $\frac{3}{16}$ " or $\frac{1}{4}$ " in the deck-plate to provide firm support using the pointed end of the small "V" rests. These holes should be located nearly in line with the shrub bar and near the side frames of the mower. (7.) Before placing the mower in the machine, measure the spacing of these holes and set the pointed mower supports at the same width. This will eliminate having to adjust the mower supports while placing the mower in the machine.

SETTING UP THE GRINDING REEL BLADES

73. Before placing the first mower in your Peerless, set both the vertical and the horizontal adjusting screws

at their mid-point or halfway positions. This will provide an equal range of adjustment in both directions.

74. Choose the most suitable pair of mower supports for the mower to be sharpened and place them in position in the Peerless. If the point supports are used, pre-set them by measuring the hole spacings on the mower. Place the mower in the Peerless inverted as shown in the various illustrations. Figure 14 shows a home-type power mower in position. Place the roller support assembly under the roller and adjust the roller rest supporting pipe in or out until the roller support is about vertical. (See Fig. 14). The roller rest supporting pipe is adjusted by moving the supporting castings on the P-447 shafts at either side of the machine.

75. Raise or lower the roller support (vertical) pipe by compressing the thumb trigger so that the mower is

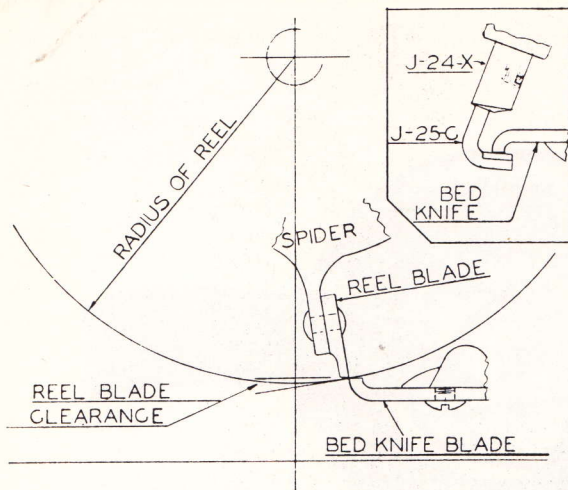


Fig. 15

level, (as though it were in mowing position set up side down). See Fig. 14. This should make the bottom of the bed knife blade about level as in Fig. 15. Move the mower supports out against each side frame to eliminate any possibility of side movement of the mower (unless point supports are used).

76. The feed control screw (2, Fig. 4) should be turned in at least half way of its length as shown in Fig. 16 to allow ample thread length for feeding the grinding wheel while sharpening. The finger point (6, Fig. 4) should be rotated as far around the grinding wheel toward you as it will go.

77. If you have a small bubble level available it can be used to advantage by laying it on the bottom of the bed knife along its length and, with the vertical side adjusting cranks adjusting the mower until it is level. Thus it will be aligned horizontally with the main carriage tracks or shafts of the machine. If a level is not available, you may sight through the lawn mower and get the reel shaft parallel with one of the main shafts of the machine, preferably the front carriage shaft, close enough by eye sight. We caution you against using the roller of the mower to sight over as this is often times set crooked and is not parallel with the reel shaft.

78. Next set the bevel to be ground on each reel blade and, in so doing, the mower will be further positioned for grinding. With the straight line grinding feed screw (#S-45, Fig. 2) backed away until it is not contacting the grinding carriage arm, the grinding head is lowered until the hook is from 1" to 1½" above the bed knife of the lawn mower. The grinding arm is locked in this position by tightening the two wing nuts (#J-80, Fig. 2). The spreader assembly (# J-16, Fig. 1) is now depressed and the hook engaged under the front edge of the bed knife in the middle of the mower. If the mower does not fall in line with the hook it must be moved in and out with the horizontal adjustment cranks at either side of the machine (# P-230, Fig. 1) until the hook will engage under the front edge of the bed knife and extend back about $\frac{1}{16}$ " to $\frac{1}{8}$ " from the cutting edge. (See Fig. 15).

79. With the hook thus engaged, see if the nearest reel blade can be rotated under the grinding wheel. If the

blade clears the wheel the mower is set too low. If it strikes the grinding wheel and cannot pass, the mower is set too high. Raise or lower the mower using the vertical adjusting cranks at either side of the machine until the reel blades clear the wheel by $\frac{1}{16}$ or $\frac{1}{8}$ of an inch. When making this adjustment be sure and turn both cranks an equal number of turns to maintain the levelness of the mower.

80. If it was necessary to move the mower up or down an appreciable amount it may be well to recheck the mower for level with the bubble level. If further vertical adjustment must be made, use the vertical cranks equally raising the low side and lowering the high side so that the center of the mower stays in about the same position.

81. Now disengage the hook from under the bed knife by compressing the spreader assembly. Holding the grinding head down with the hook touching the bed knife on the top side, move the carriage along the length of the bed knife. If the mower is not adjusted horizontally so that the hook tracks along the bed knife the same distance back from the front edge over its entire length, the mower must be adjusted with the side horizontal adjustment (P-230, Fig. 1) until the hook is traveling about the same amount back from the front edge over the entire length of the bed knife. When this is done your mower is level and parallel with the machine horizontally as well as vertically and you are ready for the next step.

82. (Refer to Fig. 16.) Engage the hook under the bed knife at the left hand side of the mower and again determine if the reel blade will pass under the grinding wheel coming within $\frac{1}{16}$ or $\frac{1}{8}$ " of it. If your adjustments have not disturbed this condition you are ready to set the bevel. If the blade strikes the wheel or clears it by too great a distance, it is again necessary to raise or lower the mower until the desired position is reached. When the bed knife is within this distance of the grinding wheel, rotate the reel blade back and forth under the wheel and, with the feed control screw turning in a counter clockwise direction or un-screwing it, cause the grinding head to lower and the wheel descend until the reel blade you are rotating back and forth just contacts the grinding wheel lightly. This is the position at which the diameter of the reel contacts the diameter of the grinding wheel and will be referred to as the "no clearance" point. If the finger point J-28C (#1- Fig. 4) were to be set in this position the reel blades would be ground without any bevel or clearance behind the cutting edge. Therefore rotate the reel blade toward you past the no clearance point of the grinding wheel and turn the feed control screw, on which there is a mark to indicate the position, clockwise one-half to five-eighths of a single turn. This lowers the grinding wheel slightly and when you rotate the reel blade back you will find that it strikes the grinding wheel and cannot pass under it. The grinding wheel now touches behind the cutting edge. Holding the reel blade at this contact point with the grinding wheel rotate the J-28C finger around the wheel until it contacts the reel blade and holds it against the wheel at this point. If the wheel were permitted to lower more than the amount allowed the one-half to five-eighths turn the amount of bevel or angle would be greater. On some hand mowers you may find it desirable a clearance angle obtained by about

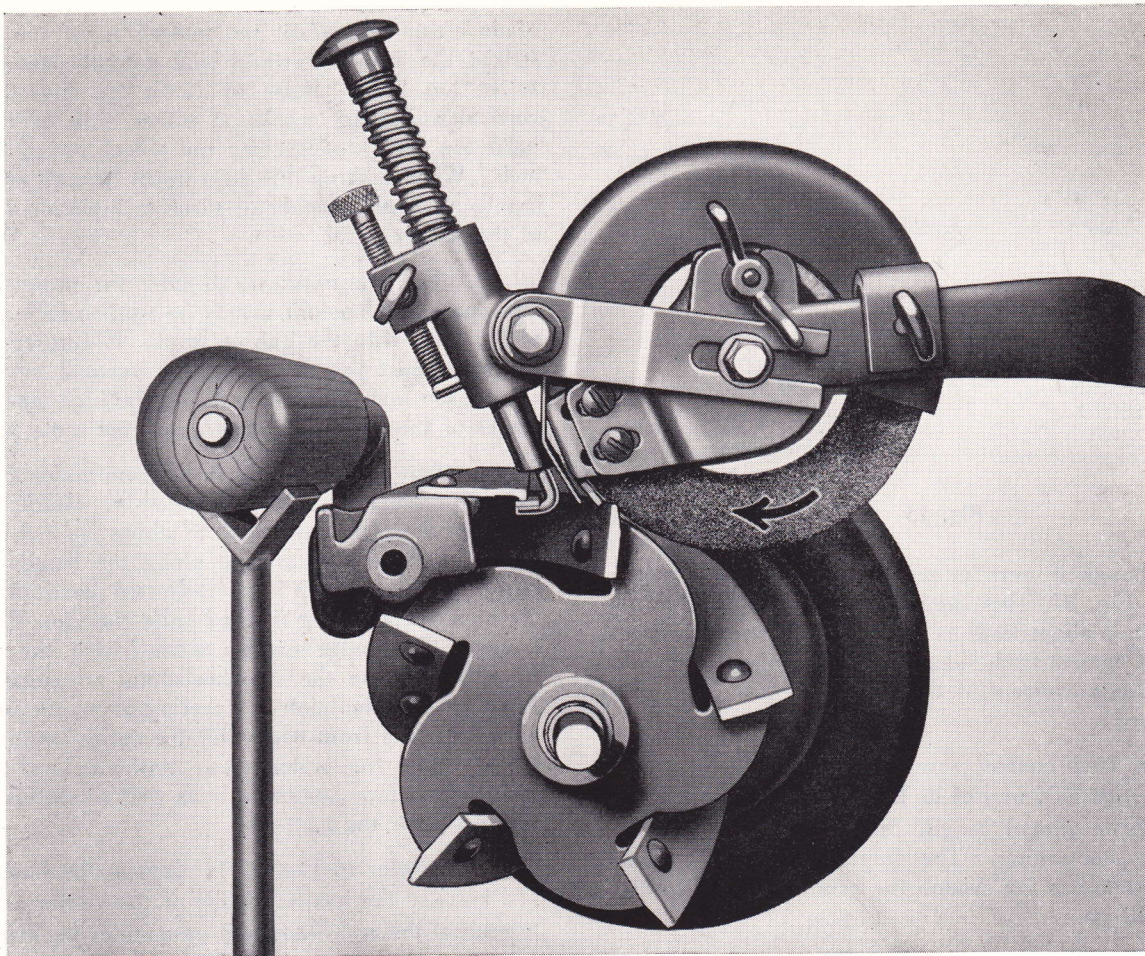


Fig. 16

a three-quarter turn of the feed control screw. On power mowers and heavy duty mowers, about a half turn will be sufficient. With this method it is possible for you to set the same amount of bevel angle on any mower by the amount you turn the feed control screw after the determining the "no clearance" point of the wheel and reel. This is the only method we know of where the exact bevel angle can be duplicated again and again on any mower and it can be altered to suit the individual. Lock the J-28C finger point in this position and you have the bevel set for grinding the reel blades. See Fig. 16.

83. You may now rotate the grinding wheel by hand, using the reconditioner pulley on the left side of the motor as the hand wheel. Turn the grinding wheel in the direction indicated in Fig. 16. The grinding wheel should scratch the reel blade lightly. If it does not, turn the feed control screw until it does. If you can't turn the wheel, turn the feed screw clockwise to relieve the pressure. Now move the grinding carriage to the right end of the mower in contact with the same reel blade. If necessary disengage the hook to move the carriage. If the grinding wheel does not scratch the same at the right hand side as it did on the left, use the horizontal adjusting crank P-230 on the right hand side to move the mower in or out until the same amount of contact is obtained, (without changing any other adjustments.) Now move the carriage back to the left hand side on the same reel blade and recheck the scratching contact there. If one side of the mower is moved to any ex-

tent, it will cause the other side to change. If the contact at the left side of the reel blade has changed, use the left hand horizontal adjusting crank to correct the change until the grinding wheel scratches as it did before. If an adjustment is needed, then recheck again at the right hand side until the wheel scratches at both sides the same amount without further adjustments. Do not change the feed control screw once you have set it at the left hand side. Make all adjustments with the horizontal adjusting cranks, do not use the vertical adjustment cranks. In checking the wheel contact, the same reel blade should be used. The scratching contact should be checked about the same distance in from the end of the reel blade at each side.

84. Set the carriage stops so that the hook has room to disengage at one end of the bed knife and re-enter at the other end. These stops will prevent the carriage from traveling too far and possibly grinding into the side frames of the mower. Now number the reel blades with chalk using the blade on which the adjustments were made as No. 1. Roman numerals serve best and you should rotate the reel blades toward you numbering them in that order until all are numbered. The mower shown in Fig. 16 has a five-bladed reel with a right-hand twist. This is the most common type and the proper direction of grinding wheel travel is from left to right. The weight feed can be wound on the cable drum in such a manner as to cause the grinding head to feed left to right. For mowers with a right hand twist spiral the weight feed should be allowed to wind

in the proper direction to cause the grinding head to be fed from right to left. The twisted spiral of lawnmower reels is called right or left. People generally do not realize that they should cut their grass in a direction that throws the cut grass on a previously mown strip instead of into the uncut grass. This would require a clockwise direction around the lawn with a left hand twist reel and a counter clockwise direction with a right hand reel. To identify the two types of reels in your machine, remember this rule: the spiral of the reel blades causes them to point toward the end of the bed knife from which you should start grinding. It is not always practical to grind a mower in this recommended direction, that is, with the rotation of the grinding wheel turning the reel and holding the reel blade against the finger point. If the reel of the mower cannot be made to turn free for any reason, it is safer to grind from the opposite direction with the finger point turning the reel against the rotation of the grinding wheel.

85. With the feed weight connected, you are ready to grind your first mower. We would suggest that you add at least one extra weight to the feed weight, and later on you may wish to use both for taking heavier cuts. The weight feed works better with a little oil applied to the surface of the hook and to the underside of the bed knife blade where the hook slides. (See inset in Fig. 15.)

86. Before you begin to grind, we suggest you practice engaging the reel blades with the grinding wheel a few times before starting the motor. Fig. 16 shows how the reel blade is engaged between the finger point and the grinding wheel. The blade should be started just behind the point of the finger allowing the taper of the finger to guide the blade down to the contact point with the grinding wheel. Use the right hand to guide the reel at the extreme end of the reel blades below the cutting edge, then if the grinding wheel should accidentally kick the reel around, you will not be cut. Also be sure that the mower is set so that the hook is in contact with only the cutting edge of the bed knife as shown in Fig. 16. If the hook should slide on a surface behind the cutting edge of the bed knife, then the reel blades would not be ground to correspond with the cutting edge which they will shear against.

87. With the hook disengaged, start the motor. The grinding wheel should grind blade No. 1 lightly and the feed screw should be left just as it is for the first pass over each blade as some may be higher than others. Starting with reel blade No. 1, grind each one in rotation, 1, 2, 3 and so on, until you are around to blade No. 1 again. The feed can be increased on blade No. 1 before starting the next round but it should only be increased on blade No. 1, the feed screw should not be moved on any intermediate blades. To increase the feed, the feed control screw is turned counter clockwise approximately $\frac{1}{8}$ of a turn. Always lock the feed control screw with the thumb screw after changing the feed. During the first or second time around the blades, check to see if the grinding wheel is cutting heavier on one end of the reel than on the other, not on one single blade but on all of them. If this occurs, further adjustment is needed and the side that is light should be moved in closer with the horizontal adjusting crank. Continue grinding in rotation and notice if there are any high or low spots. The grinding wheel will speed up

across a low spot and slow down to grind a high spot. You will soon be able to detect by the sound of the grinding wheel and the travel of the carriage when all blades are ground evenly. Stop when you come to blade No. 1 and inspect the blades to see if you have reached a new cutting edge. It may be necessary to increase the feed again and repeat the rotation as many times as are needed to true up all the blades and bring each one of them to a sharp, new cutting edge. While the grinding wheel is grinding on a reel blade, do not touch the grinding head as any pressure would cause the grinding wheel to be forced down and it would not follow the bed knife.

88. After you have ground around the reel enough times to bring each blade to a keen sharp edge and the grinding carriage has traveled uniformly across all the blades, you are ready to take the two finishing cuts that will complete the sharpening operation. Remove the extra weight from the weight feed as the finishing cuts are much lighter. The reason for making two finishing cuts is that the grinding wheel itself wears down slightly on each pass and we must compensate for it. The feed has been increased each time on blade No. 1 and when the last blade was reached, it was left just a trifle higher due to the wear of the grinding wheel. With the minimum of weight on the weight feed, turn the feed control screw counter-clockwise about $\frac{1}{16}$ of a turn (half the usual amount,) and grind the reel in rotation 1, 2, 3, etc. as you did before. When you finished the last blade, No. 5 on a five bladed reel, go over blade No. 5 again **WITHOUT INCREASING THE FEED.** *This is the only time you will grind the same blade twice in succession.* Go over each blade in reverse rotation, 5, 4, 3, 2, and 1. This is the second finishing cut and compensates for the wear of the grinding wheel. Each blade is now finished exactly alike.

89. Before removing the mower from the Peerless, especially a hand mower, take a hand file and taper or round slightly the ends of each reel blade. This will aid in adjusting the bed knife and will prevent any clicking that some mowers tend to have at the ends of the reel blades. Later you can use the grinding head controlling it by hand to relieve the ends of the reel blades. If you have ground a hand mower, remove it from the machine and place it on a bench for final adjustment. If you have ground a power mower, leave it in the sharpener for final adjustment even though it seems a bit awkward to reach the adjusting screws. In making the final adjustment of the bed knife to cutting contact with the reel blades, remember that the pressure of the adjusting screws must be maintained so that the shape of the bed knife will not be changed. In moving the bed knife up to the reel blades with the opposed type of adjusting screws, remove a little pressure from the front screws and add the same amount to the rear screws. The bed knife should be brought up in this manner by steps until reel blades begin to strike. Once contact is made, insert a piece of paper between the blades as shown in Fig. 13 and turn the reel backwards so the reel blades pinch the paper from behind the bed knife. When you have the bed knife adjusted properly, the reel blades will shear or mark the paper the same at both ends or at any point. If one end shears the paper and the other end merely marks it, the marked end is not adjusted as close

as the other end. This is the only way to get both ends adjusted alike, you cannot do it by sound alone. The adjustment may sound perfect to your ear but the paper test will show if both ends are the same. You will have a perfect cutting contact at every point of each blade and the bed knife because each reel blade was ground to fit the bed knife. Grinders that do not use the Hook Grinding Principle grind both the reel blades and the bed knife to a straight line and then attempt to fit them together. Invariably a considerable amount of lapping is necessary to make them fit. This principle of grinding can be done with your Peerless and is referred to as the Straight Line Grinding Principle. It works well on the heavier lawnmowers and on greens mowers, where lapping is desired anyway, and where the construction and design is such that the minimum of distortion is obtained in the bed knife when it is clamped into the mower and adjusting pressure applied.

90. Some users of the Peerless put oil or grease on the bed knife before it is adjusted to the reel blades. The two sharp edges often cut into each other slightly as the reel blade grinding leaves a slight wire edge that must shear off. Oil or grease on the bed knife helps this condition and the reel should be turned in the reverse direction as much as possible while the bed knife is being adjusted. Some Peerless users set mowers a little tighter than usual and then explain to their customers that after fifteen minutes of mowing, the mower will free-up and then stay permanently adjusted. This allows for the wire edge to wear away and still leave a good cutting adjustment that will not have to be changed. A few vigorous shoves of the mower across your shop floor will tend to seat the reel blades and the bed knife together and will enable you to make a more permanent adjustment before the mower is turned over to your customer.

91. The reason that we have recommended leaving power mowers, particularly the home type, in the Peerless after grinding the reels is that power mower reels are driven by the engine and they, in turn, drive the wheels. This is just the reverse of a hand mower on which the wheels drive the reel. Hand mower pinions turn free and the reel remains stationary when the mower is pulled backwards while the power pinions turn free when the mower is being pushed forward. Also a power mower reel revolves backwards when the mower is pulled backwards and this makes it possible to back-lap or seat in a power mower slightly before removing it from the sharpener. Follow the same bed-knife adjusting steps as outlined above and then, using the mower wheel as a hand wheel, revolve the reel backwards applying a small amount of lapping compound. This will remove the wire edges and make the adjustment permanent. It also improves the sound and fit of the mower.

92. The sharpening and adjusting operations are now complete and the mower is ready for reassembly. You will undoubtedly encounter power mowers which will require different placement of the roller rest than we have described previously. On some power mowers, the roller rest can be placed in the same position as for hand mowers. On others it will be more convenient, and sometimes necessary, to place the roller rest under the handle of the mower. Place the roller rest where it is most convenient

as long as the mower is solidly supported. Sometimes the handle of a power mower may make it possible to adjust the mower so that the bed knife is level. Such a mower can still be ground satisfactorily so long as the grinding head and arm are parallel with the bottom of the bed knife, that is, both form the same angle. In other words, the grinding head and arm must be level with the mower although neither are level with the floor.

We again emphasize that you will have to use the experience and judgment gained in grinding hand mowers and conventional power mowers to cope with the different angles and settings that will be required to grind all the various sizes and types of lawnmowers.

93. To simplify the steps in setting up the lawnmower in your Peerless grinder for sharpening, we will restate them. Previous instructions were complete to cover every aspect for the beginner and they undoubtedly made the setting up operation sound much more complicated than it really is. Actually, it can be broken down into three or four steps. They are, (1) place lawnmower in the machine and adjust lawnmower in and out, and up and down until, with the hook engaged under the bed knife in the middle of the lawnmower, the reel blades will pass under the wheel and within $\frac{1}{8}$ " of the wheel. (2) Lower wheel until reel blade is just striking, then lower an additional half turn of the feed control screw and set finger to give proper bevel on reel blade. (3) Using the horizontal adjustment crank, set the grinding head so wheel is scratching the same reel blade the same amount at each end of the lawnmower. (4) Hook up feed weight and grind each reel blade according to instructions. Actually these steps will become second nature and will apply to the setting of any lawnmower where the hook grinding principle is used.

94. There is little need of instructions on reassembling the mower—just follow in reverse the steps taken in disassembling it. On power mowers we suggest that the drive chain and sprockets be cleaned and the roller and other frictional points be lubricated to assure customer satisfaction. Power mowers should be started, if possible, and the reel should be run. If grass is available, a few feet of mowing will remove most of the lapping compound. However, excessive running of the reel without the removal of the compound is not recommended. Clutch and belt adjustments should be checked and the mower should be put in shape to be returned to the customer for operation. Remember, a satisfied customer is the best reputation and business builder. He will bring you more new business than any other medium. Do your part right and you will find that the Model 600 Peerless Lawnmower Sharpener is one of the best money-makers you could possibly own.

95. INSTRUCTIONS FOR STRAIGHT LINE GRINDING. After the bed knife has been removed and ground, you have a choice of grinding the reel of the lawnmower by two methods: (1) if the mower is of such a design that the complete reel assembly is readily removed from the frame, as many of the modern type mowers are, particularly those which have the cutting section in front and out ahead of the drive wheels or rollers, the bed knife can be set aside and the reel ground completely separate. For

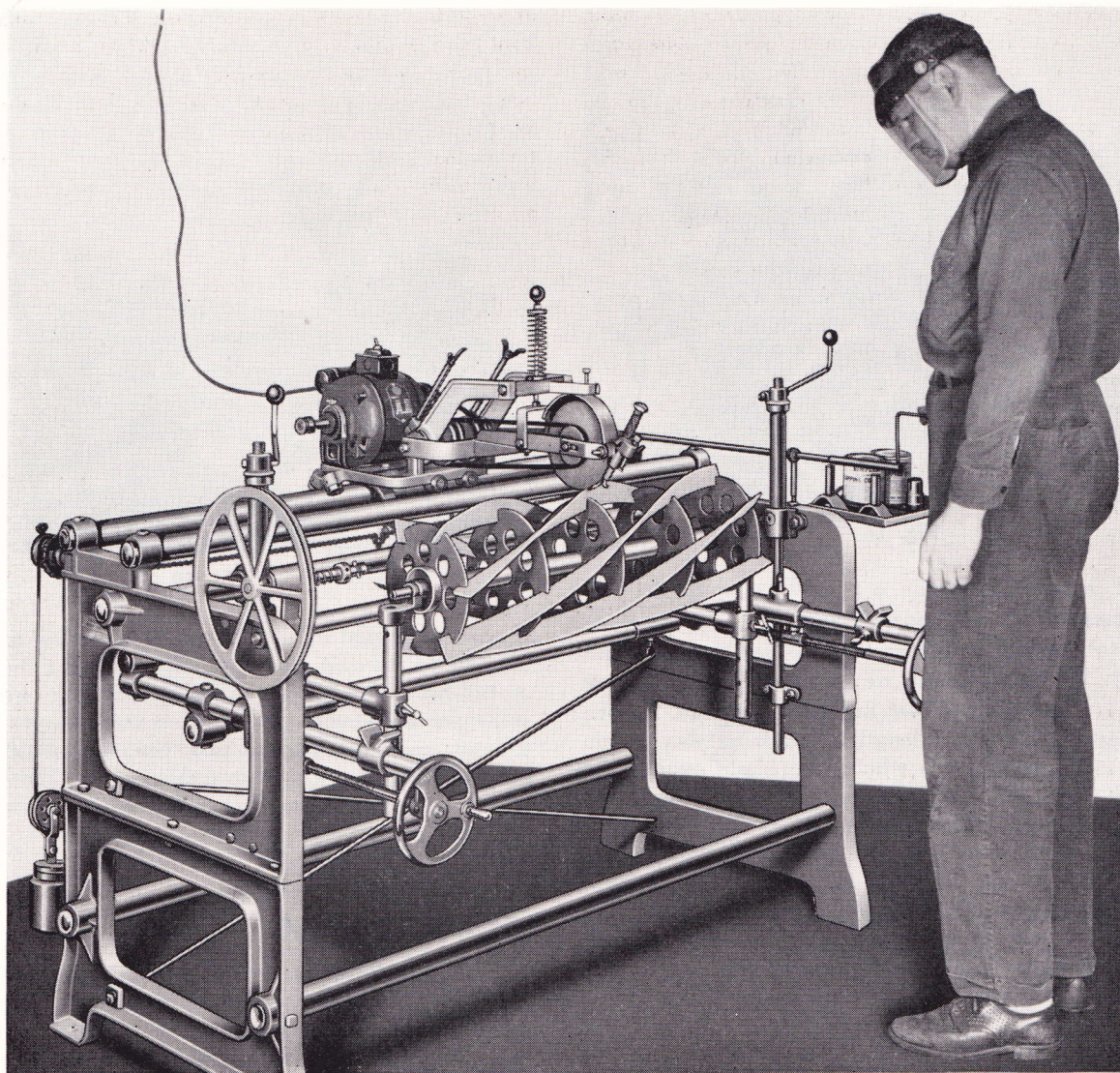


Fig. 17

this operation, after the reel has been removed from the frame of the lawnmower, the offset V-rests equipped with bearings are used to hold the reel in the Peerless. (See Fig. 17) These offset reel support bearings are slipped on over the mower support shafts, and the mower supports then spaced so that the reel will fit on these offset V-bearings, preferably at the same area of the reel shaft that the bearings of the reel contact. Most reels have turned shoulders of different diameters, and the inner-most shoulder is usually the area that the reel bearings fit on, and wherever possible this shoulder area should be used.

96. After the reel is placed on the bearings, the grinding head should be lowered about level, and the reel moved in or out and up and down until it brings it in under the center of the grinding wheel. The grinding head should be set so that when it is level the reel blade is missing the grinding wheel about $\frac{1}{8}$ ". For this setting, remove the reel and place the roller rest pipe across the V-supports, and, using a level on this pipe, set the mower supports so the pipe is exactly level. Then, replace the reel and with the telescoping height gauge supplied with

your machine, check the distance from the reel shaft to the front main carriage shaft of your Peerless. Then check the opposite end of the reel and adjust accordingly until the reel is set an equal distance at both ends from the front main carriage shaft. This now means that your reel is level and square with the grinding travel of your Peerless. Now, using the S-45 straight line grinding feed control screw, screw the grinding head down until the reel blade is just striking the grinding wheel and the no clearance point is found, the same procedure as outlined in the hook grinding instructions. After this point is found, screw the grinding head down about three-quarters of a turn, allow the reel blade to rotate back against the grinding wheel, and set the bevel control finger, (6, Fig. 4).

97. You are now ready to straight line grind the reel blades, and you need not adjust further, as was necessary in the hook grinding instructions, to obtain a grinding wheel contact at each end of the reel blade. You have set the reel perfectly square and level, and your machine will grind the reel into a true cylinder. Should the reel be slightly larger in diameter at one end than the other this will be noticed when you start to grind. The object of this

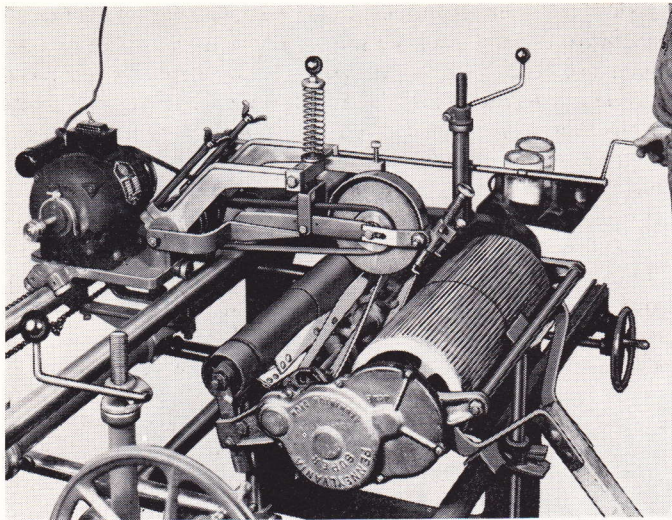


Fig. 18

method of grinding to obtain a true diameter of the reel is sometimes called "Cylinder Grinding". Again, it is necessary to number the blades and proceed to grind with number 1. In this operation we recommend that you use the hand crank feed to travel the grinding head. When you have ground the entire length of blade number 1, you will find it is necessary to rotate that blade against the back of the finger point, in order to turn the grinding head to the opposite end. The grinding wheel does not come up and clear the reel as it did in the hook grinding principle. It is, therefore, necessary to turn the reel by hand while the grinding head is being returned to the starting position. Once the starting position has been reached, blade number 2 is turned into position and, again, the grinding head is cranked across the reel blade.

98. All the rules and principles governing the hook grinding operation apply to this method of grinding and the reel blades will point to the end from which you should start grinding. Again, all blades are ground until a new sharp edge is obtained on all blades over their entire length. When this is done a lighter cut is taken and the same finish instructions as for hook grinding are followed. The reel is thus finished and ready for assembling.

99. Another method of grinding the reel by the straight line principle would be to place the entire mower in the machine, but without the bed knife assembly being replaced in the mower. (See Fig. 18). Thus, the mower would be in the machine and the reel free to turn in its own bearings. Here, again, the mower is positioned with the adjustments supplied on your Peerless and the reel leveled and set so it will be square with the front main carriage shaft. After you have positioned the mower so it is square, you are again ready to follow the instructions outlined above in straight line grinding for grinding the reel blades.

100. In the above instructions it will be up to the operator to make his choice of which of the three methods to use in grinding the reel blades. Different mowers will lend themselves better to the different methods and principles involved. It is desirable, wherever possible, to allow the reel to turn in its own bearings. However, some mowers

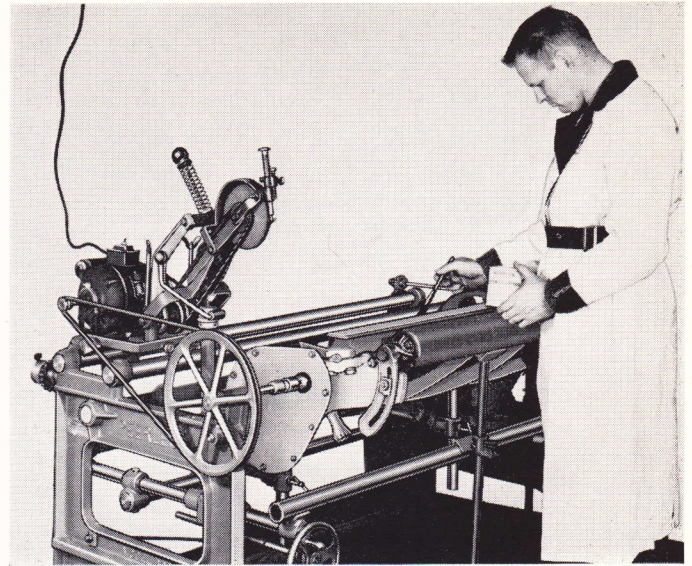


Fig. 19

cannot be ground by the straight line method with the reel turning on its own bearings without having the bed knife assembled in the mower, as the reel bearings would not be in proper adjustment. After a few more mowers have been ground, and experience gained, you, the operator, will be able to utilize the many advantages in the Peerless and select the best method and procedure for grinding each particular mower.

INSTRUCTIONS FOR RECONDITIONING

101. The Reconditioner is supplied with the Model 600 Peerless Sharpener to provide a means of "lapping-in" mowers after they have been ground. (See Fig. 19). While the reconditioner is not essential to complete a good grinding job, it has many applications on different types of mowers. We will explain when and how it can be used to advantage.

102. To use the reconditioner for lapping-in, we recommend that hand mowers be placed in the Peerless right side up or the reverse of the position used for grinding. The left hand wheel and pinion gear must be removed. Raise the roller rest so that the bed knife of the mower is inclined downward. This causes the lapping compound to flow back into the reel blades after being wiped off on the bed knife, thus it is reused. The adjustable mower supports provide a quick setting of the mower to the point where the reel shaft can be coupled to the reconditioner. The reconditioner drive shaft can also be aligned with the reel shaft axle before the coupler is placed on, as the spring on the reconditioner shaft allows end movement sufficient to place the coupler on the reel shaft after the reconditioner guide shaft is aligned.

The reconditioner attachment can be driven in either direction by crossing the drive belt. Power mowers may be placed in the Peerless upright or inverted, as the Reconditioner has the added advantage of being able to drive in either direction. The ratchet pawl of the mower can sometimes be used as a driving key for the coupler. However, in some cases the pawl is too short and it will be necessary

to make a driving pin from $\frac{3}{16}$ " rod or $\frac{1}{8}$ " x $\frac{3}{8}$ " flat stock, depending on the type of pawl used in the mower. Most mowers have a $\frac{5}{8}$ " diameter reel shaft which will require the use of a $\frac{5}{8}$ " bushing in the driving coupler. Three sizes of bushings are supplied and you can select the proper one to use with the mower.

103. On some mowers the drive will have to be through a socket on a nut which is located on the end of the reel shaft, used to retain the bearings. If the socket supplied with your Reconditioner accessories does not fit, any tool box socket can be used as there is a square socket driver supplied which will accommodate a tool box type of socket. After centering the driving pin or pawl in the reel shaft, and slipping the driving coupler on, you are ready to start the motor and apply the compound on the reel blades as they turn backwards, using at least a 2" brush for this application. (See Fig. 19). The rest of the operation is automatic and additional compound is applied as needed. If you wish to lap the mower completely, continue to apply the compound until the reel is no longer making contact with the bed knives. If you merely wish to lap it in and leave contact, then stop the lapping operation after three or four minutes, when it is noticeable that the reel speeds up and the sound affirms that the contact of the reel knives with the bed knife is much lighter than when the lapping operation was started.

104. After the mower has been lapped in, remove the compound either by using a rag or by pushing the mower in the grass. If the adjustment is too tight, the bed knife may be set up a little and you may be assured that the final adjustment will be permanent as the blades have seated together and the wire edge has been removed.

105. There are a few mowers that are not driven by the conventional pinion and pawl. These mowers use a new type of pinion gear without the standard pawl to drive the reel. Some power mowers use a new type of pinion gear keyed to the shaft without any slots to use a driving key or pawl. On mowers of this type, a Jacobs Chuck can be used to grip the reel shaft for lapping in. A less expensive alternate is to drill and tap a hole in the side of the driving coupler for a set screw to clamp against the reel shaft. Another possibility is to use a short length of rubber hose and hose clamps to make the coupling. Some Golf Course mowers have hex head driving nuts on the ends of the reel shaft and the hex sockets supplied, or sockets from a standard socket set, can be used for coupling to this type of drive.

Bear in mind that, when lapping, you are wearing away the bed knife four or five times faster than any one reel blade, therefore lapping should be kept at a minimum. Fig. 19 shows the reconditioner in use on the Peerless and the method of applying the compound.

106. There are mowers on the market today known as the silent type and these *must* be lapped out until the reel blades no longer make actual contact with the bed knife. Most of these mowers are of steel construction and if there were actual metal-to-metal contact between the bed knife and the reel blades, the vibration and noise would be objectionable. The more popular mowers of this type the the Silent Yardman, Michigan Noisless, and the Sears & Roe-

buck Craftsman. The principle of the silent lawnmower is simply that the reel blades do not actually touch the bed knife but clear by about 1-1000th of an inch. This type of mower is sharpened in the regular way and the bed knife is adjusted to contact with the reel just as any other mower. Then, using the Reconditioner, lapping is continued until the reel blades no longer touch the bed knife. The use of our ready-mixed compound (fine) will give the necessary 1-1000th of an inch clearance and the mower will readily cut grass or paper, yet be silent. Do not continue the lapping operation until the mower is completely silent as the compound itself will continue to make some sound, even after the blades are no longer touching. When you think it has lapped-in long enough, wipe off the compound and test to see if it is silent. Any well constructed mower can be made into a silent mower, the prime requirement is good reel bearings. Such a mower could be lapped-in until it was silent.

107. Some shops doing a large mower business find it advantageous to have a separate lapping machine. We manufacture a portable lapping head or a complete machine in our Simplex Reconditioner. If your business grows to this point and the use of the reconditioner on your Peerless delays production, the answer is our Simplex Reconditioner, Model 500-C.

108. It is important to impress upon your customer the fact that he should not attempt to adjust a silent mower or a conventional mower that you have lapped out. Any adjustment is next to impossible due to the fine amount of clearance which was achieved by lapping. To change the adjustment would be to change the mower to a conventional type with the bed knife and reel in actual contact. A silent mower should be used until it will no longer cut satisfactorily, then be returned to your shop for adjustment and reconditioning with the lapping process. After one or two reconditionings, it will be ready for grinding again.

SHORT CUTS ON SHARPENING MOWERS

109. Why do many old mowers miss in the middle and lock at the ends of the reel blades? This is caused by vibration at the center of the bed knife which is the weakest point in a dull mower. The bed knife is usually set too tight to force it to cut. When mowing at high speed, some times obstructions get between the ends of the reel blades their weakest point, and the bed knife thus springing the reel blades backwards and outwards. This causes the reel blade to be too high and it hammers the bed knife. The reverse happens to the center of the bed knife, its weakest point, springing it down and causing it to miss. It is possible, when making the final adjustment after sharpening, that, if the adjusting screw pressure is greater, the center of the bed knife may be sprung down causing it to miss. If this happens, try releasing a little pressure on the back adjusting screw.

110. Intermittent hitting reel blades, a puzzle? When the spiral knives or reel blades wipe the bed knife one time around and miss another time, it is probably one of these ailments: (1) A self-adjusting mower with the cones mounted on the reel shaft or the cones mounted on a light

stamping which has broken and allows the cone to turn. Nothing but a new bearing will overcome this. (2) A loose bushing revolving around the shaft. (3) A cracked or broken ball in the ball bearing. (4) A flat roller in the roller bearing. There is nothing to do but to take out the shaft and replace the defective parts. If you have already ground the reel blades before finding this ault, you will have to regrind them after the new parts are installed. Be sure and examine every mower carefully for these faults before grinding. These defects are rarely found but, when they are, it is a problem for a beginner.

111. Cause of wavy wipe of reel blades on the bed knife. (1) Loose reel bearings. (2) Spring tension, self-adjusting ball bearings. (3) Cutting edge of bed knife protruding too far under, or ahead, of center, of reel shaft. Set of bed knife does not tip slightly up at the front edge but sets too flat in relation to the reel blades. These troubles are probably caused by some one replacing the bed knife with one that is wider than the original or, in the case of the non-lipped bed knife, one that has simply been ground too far back. To remedy these conditions: (1) Take up loose bearings. (2) Put new springs behind self-adjusted bearings. (3) Take out bed knife and grind front edge back if it is too wide and a wide wiping contact is being made. (4) Either shim down the back edge of the bed knife thereby throwing the front edge up or take the bed knife out and grind more clearance behind the cutting edge. Be sure to make the above repairs before grinding in the reel blades. The above conditions will rarely be found in present day mowers but occasionally you may receive the old-type mowers which have the non-lipped or flat bed knife on which someone has replaced the original bed knife with one of improper width or thickness. We are elaborating on these possibilities because they are difficult to figure out and you may meet these conditions among the first mowers that you get.

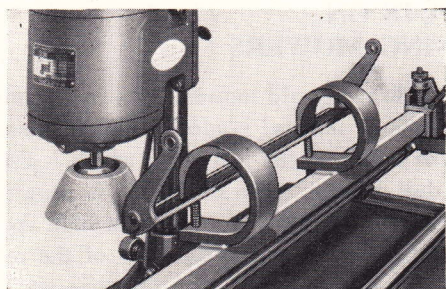


Fig. 20

INSTRUCTIONS FOR DRESSING THE GRINDING WHEEL

112. Figure 20 shows the W-185 Grinding Wheel Dresser being used. This mechanical dresser is mounted on a sealed ball bearing and enables you to keep your wheel dressed to the proper crown at all times. It also enables you to keep your wheel perfectly round and thus eliminates the possibility of your wheel becoming egg shaped which would cause excessive vibration. You will notice that the grinding wheel has a tendency to wear flat and at an angle. This is caused by the spiral of the reel blades. Grinding should always be done in the center of the grind-

ing wheel directly behind the J-28C finger point and in line with the J-25C hook.

DON'TS AND CAUTIONS

1. Do not attempt to grind mowers until you study these instructions carefully.
2. Do not grind a good mower until you are familiar with the sharpener, practice on an old one.
3. Use plenty of kerosene oil in pinion gears, clutches, dogs, or ratchets of a mower. This makes slipping clutches grab and hold fast. It also saves installing new ratchets or pawls when not actually needed.
4. Do not force set screws, adjusting screws, or bolts. Use a rust-removing penetrating oil on them or heat them quite hot with a torch to loosen them.
5. Do not forget that by forcing adjusting screws or bolts, you can easily break a lawnmower frame casting.
6. Do not try to tighten one adjusting screw without loosening the opposing adjusting screw, something may break.
7. Do not force the adjusting screw if the bed knife does not set up to the reel blades. The pivot points at the ends of the bed knife may be rusted fast to the mower frame or the opposite adjusting lug may be dead against the frame with all the adjustment taken up. Take the bed knife out and grind off the lug to fit.
8. Do not use case hardened pawls, dogs, or pins in the pinion or drive gears of a mower. They cut out notches rapidly. It is cheaper to replace pawls than pinion gears.
9. Do not fail to keep the J-25C hook set as close to the grinding wheel as possible. See Fig. 16 for the correct setting.
10. Do not use extra weight on the weight feed for thin-bladed mowers. If the cut is too light, retard the travel of the grinding head by hand.
11. Hold the grinding head when it disengages from under the bed knife at the end of the blade. Do not allow the grinding head to fly up when the hook is released.

MOWER PARTS SERVICE

Remember that our Mower Parts Division is ready to serve you on lawnmower repair parts and supplies. We are expanding this division every year to include more and more parts and expect to eventually have parts available for every make of mower. If you did not receive our Mower Parts Catalog with your machine, write for one today and select a stock of parts to have on hand.

TELL US HOW YOU LIKE YOUR NEW PEERLESS SHARPENER

We would appreciate hearing from you after you have used the Peerless Sharpener for awhile. Tell us exactly what you think of it, how much success you have had with it, what your customers say about their mowers after you sharpen them. If you don't mind telling us, we would like to know how much money you are able to make with the Peerless in a season. If you have no objection to our using your letter for advertising purposes, please state this at the bottom of your letter. We always appreciate photographs of Peerless installations and if you can supply one, please do so.

INSTRUCTIONS FOR ORDERING

1. Give the serial number of your machine with each order for parts. This serial number is stamped on the name plate which is fastened to the left hand main frame. This is very important to assure that you will receive the proper parts for your machine.
2. Order by part number from the Parts and Price List which covers your machine. Give all the information you can.
3. Please observe the terms stated on the Parts and Price List. We cannot open ledger accounts for parts orders.
4. Be sure your name and address is on your order, we do not save the envelopes so your address on the envelope is not enough.
5. If at all possible, anticipate your needs and order early. Our busy season lasts from February to May and we may be several days behind on shipments during this period. Parts orders at any other time are assured of prompt shipment.

THE FATE-ROOT-HEATH CO.

PLYMOUTH, OHIO

Guarantee

We, The Fate-Root-Heath Company, fully guarantee the Ideal and Peerless Lawnmower Sharpeners, Simplex Reconditioner, Accessories and Equipment to be honestly constructed of only high grade materials by skilled mechanics. If, within one year from date of purchase, any part or parts should prove defective, we will replace them free of charge.

THE FATE-ROOT-HEATH CO.

John A. Root
PRESIDENT



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BED KNIFE STEEL, ROLLERS, HANDLES,

SPRINGS, ETC., WRITE

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